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Contents

Dumbarton Oaks Papers

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George H. Forsyth and the Sacred Fortress at Sinai

ILENE H. FORSYTH
WITH
ELIZABETH SEARS

George H. Forsyth first visited the fortified monastery of St. Catherine at Mount Sinai in 1956; analysis of the architecture and siting of the complex, with its sixth-century foundations, would sustain his interest for over three decades (fig. 1). As chief organizer of the Michigan-Princeton-Alexandria Expeditions, Forsyth, together with teams of specialists, made four lengthy excursions to the monastery in the late 1950s and early 1960s in order to study and document the site in comprehensive fashion. An architectural historian with training as an architect and a good deal of archaeological field experience, Forsyth would be the first to submit the complex to rigorous study using modern scholarly methods (fig. 2). His meticulous survey yielded not only an extensive set of field notes and an invaluable run of photographs, but also dozens of measured drawings, precisely crafted and highly informative, executed over a period of many years. Examples are here published for the first time (figs. 3–9, 14–15).[1]

Drawing always played a key role in Forsyth's analytic process. To render an architectural complex with detail and precision, he believed, was to come to know the site intimately and completely. It meant working to penetrate the enigmas that issued from study and trying to solve them through close analysis of built form. Forsyth believed that the final graphic explanations in his drawings would invite close consideration of the original builders' struggles to respond to the varied strictures imposed upon them, such as the demands of patrons, the necessary sequencing of construction, the peculiar exigencies of the site (in relation to economic, political, technical, material, environmental, and functional factors), and the perhaps lofty expressive aims underlying the conception of the design as a whole and expected to inhere within it. Although any one of his final drawings might look like a crisp, skeletal diagram, each was crafted to embody, indeed graphically encode, all of these matters in its forms. An account is here offered of Forsyth's working methods and the insights he could claim as a result of his efforts. Forsyth's restating of the problems posed by the sixth-century remains at Sinai and his attempts at their solution may even now encourage fresh thinking about the challenges that were identified and ingeniously met by the sixth-century architect and the artisans who worked with him on the mountain.

1 Forsyth's correspondence and his papers, not yet catalogued, are to be deposited at the Bentley Library and the Sinai Archive, University of Michigan, Ann Arbor. A typescript catalogue, "Drawings of the Monastery of Saint Catherine at Mount Sinai by George H. Forsyth, Jr.," prepared by Ilene Forsyth and Lois Drewer, describes the works, which are given numbers from 601 to 654, with some of the entries subdivided to include multiple related drawings.

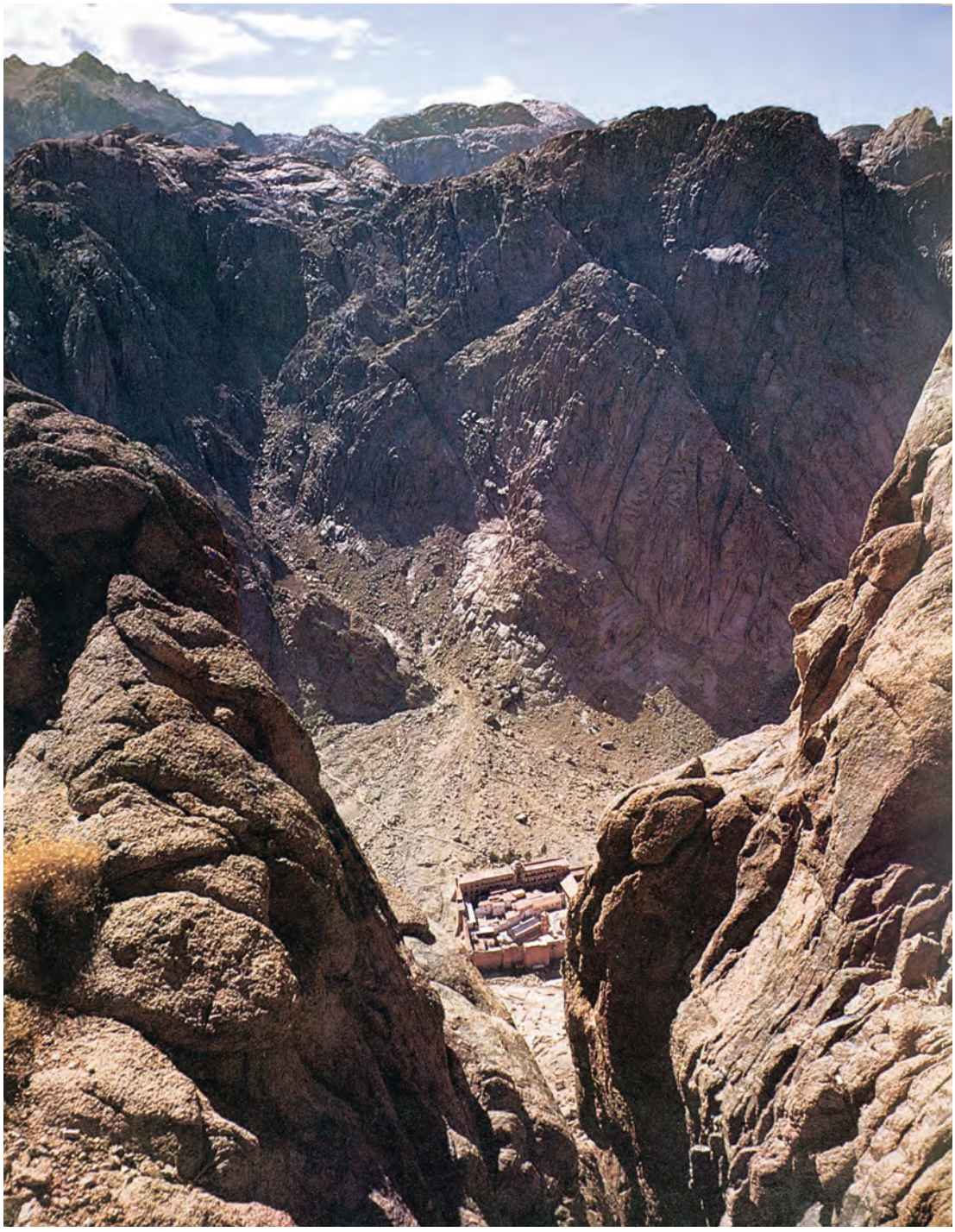
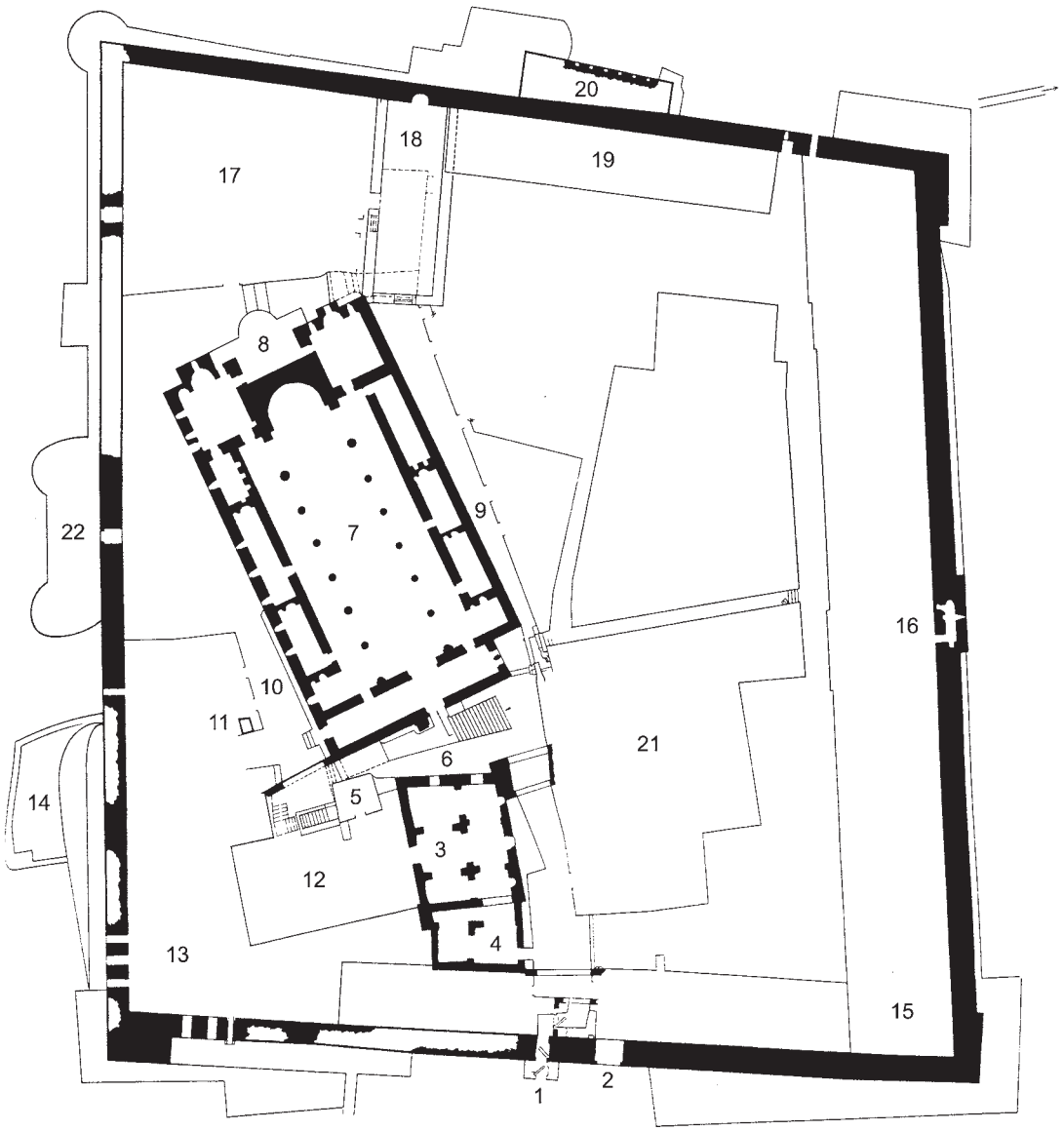


FIG. 1. Monastery of St. Catherine, Mount Sinai, view from the northeast (photo: John Galey, reproduced in *Sinai and the Monastery of St. Catherine*, fig. 51)

FIG. 2. Forsyth working with a plane table at Sinai, ca. 1960, Ilene H. Forsyth collection (photo: University of Michigan)



1. Porch, originally postern gate
2. Original portal, now blocked
3. Mosque (converted sixth-century structure)
4. Sixth-century antechamber
5. Minaret
6. Court and steps down to basilica
7. Basilica
8. Burning Bush Chapel
9. Uncovered passage at upper level
10. Uncovered passage at lower level
11. Well of Moses
12. Terrace on sixth-century arches
13. Sixth-century rainwater channels and sluicegates
14. Cistern
15. Modern building above complex of sixth-century arches
16. Sixth-century chapel
17. Modern service quarters above sixth-century kitchen
18. Refectory, medieval
19. Modern living quarters
20. Former latrine tower
21. Post-sixth-century structures of various uses and dates
22. Kléber's tower, early nineteenth century

FIG. 3. Drawing by George H. Forsyth, plan situating visible sixth-century structures (black) in the present-day monastic complex, Monastery of St. Catherine, Mount Sinai (drawing no. 601.1), Ilene H. Forsyth collection (scan: University of Michigan)

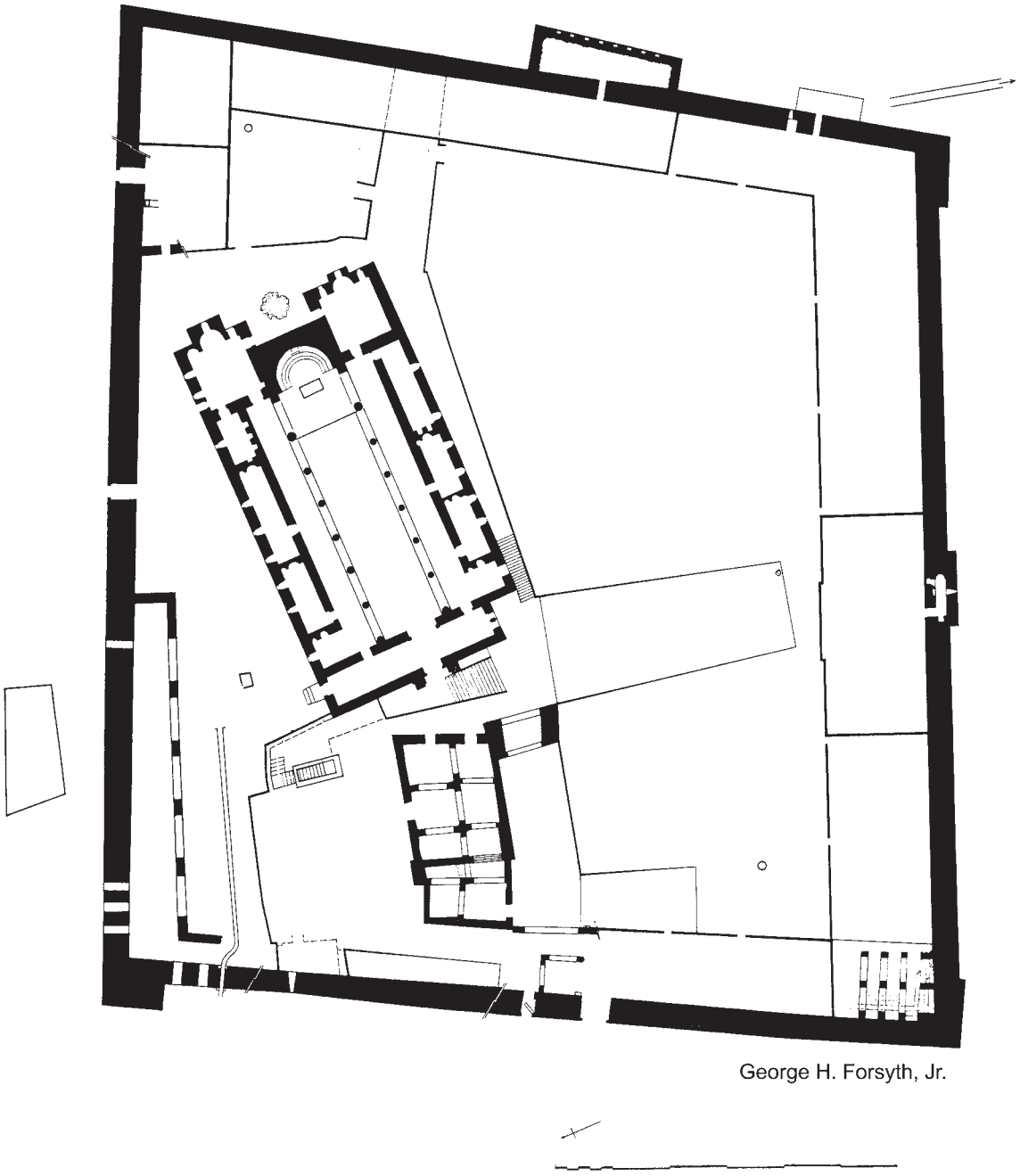


FIG. 4. Drawing by George H. Forsyth, plan of the sixth-century complex, Monastery of St. Catherine, Mount Sinai (drawing no. 601.2), Ilene H. Forsyth collection (scan: University of Michigan)

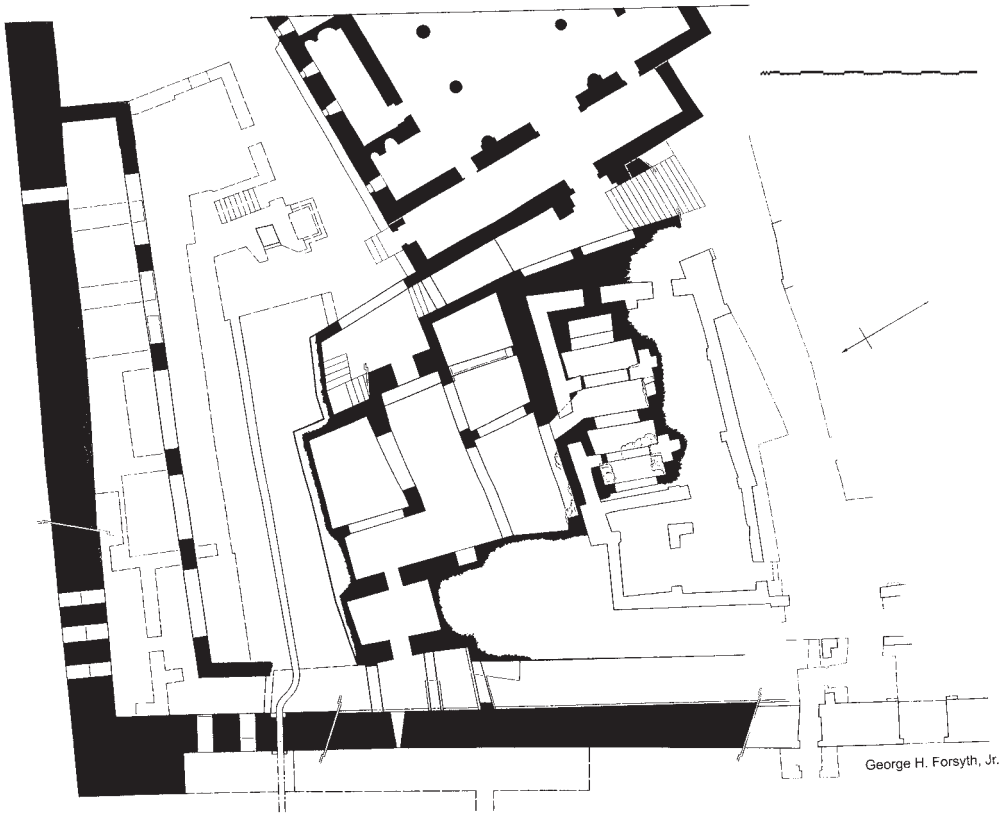


FIG. 5.
Drawing by George H. Forsyth, plan of the north corner of the sixth-century complex showing walls, with rainwater channel and sluicegates, and *souterrains*, Monastery of St. Catherine, Mount Sinai (drawing no. 602), Ilene H. Forsyth collection (scan: University of Michigan)

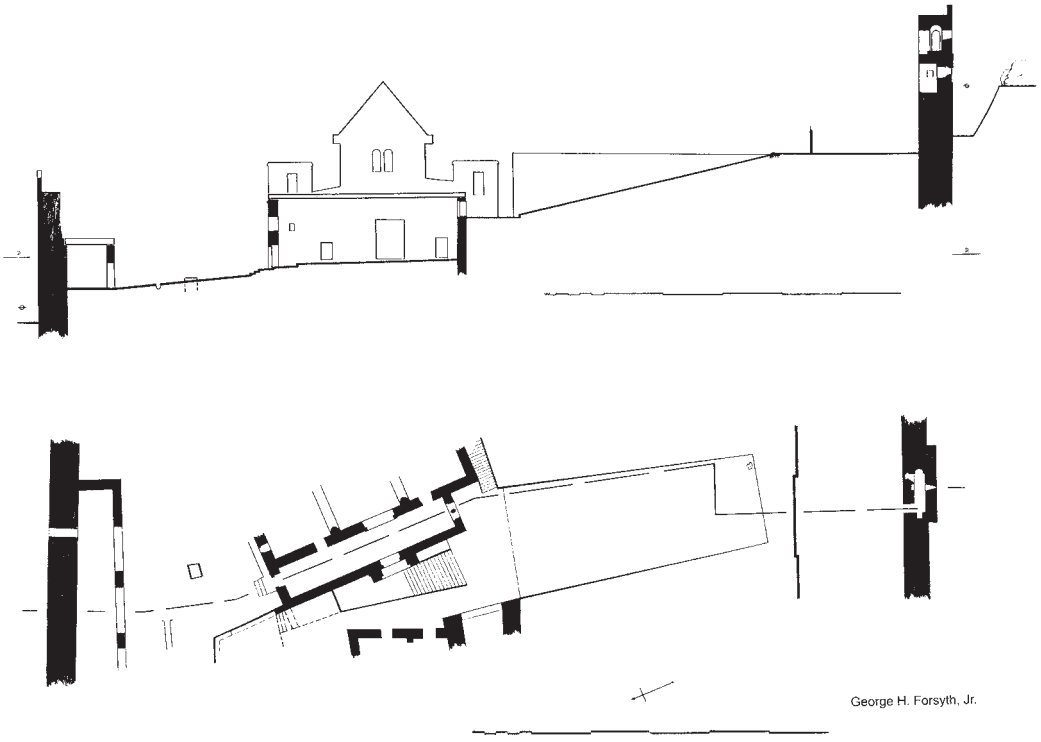


FIG. 6.
Drawing by George H. Forsyth, cross-section and plan of west end of basilica of the complex, Monastery of St. Catherine, Mount Sinai (drawing nos. 614a–b), Ilene H. Forsyth collection (scan: University of Michigan)

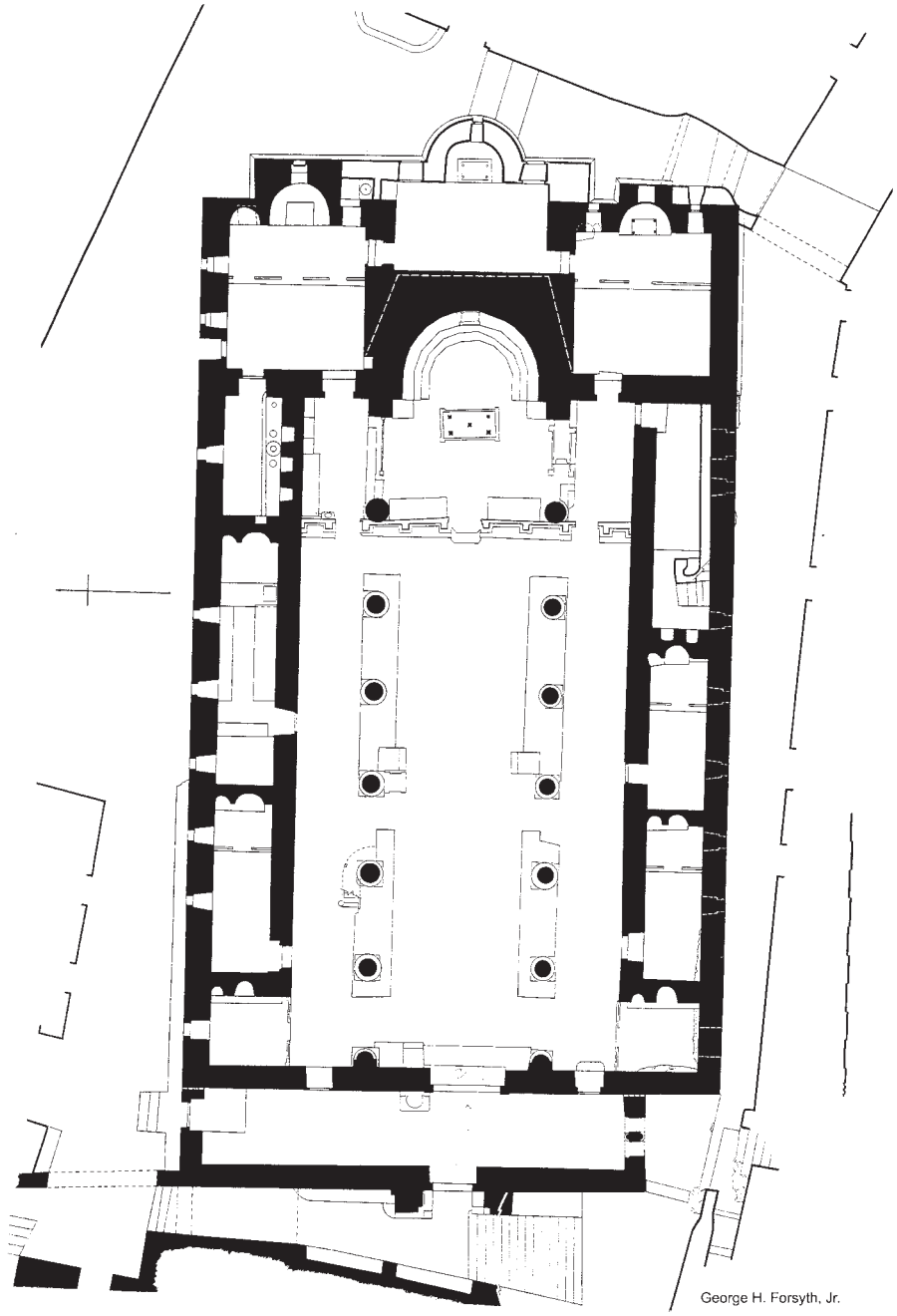


FIG. 7. Drawing by George H. Forsyth, plan of the basilica, Monastery of St. Catherine, Mount Sinai (drawing no. 624), Ilene H. Forsyth collection (scan: University of Michigan)

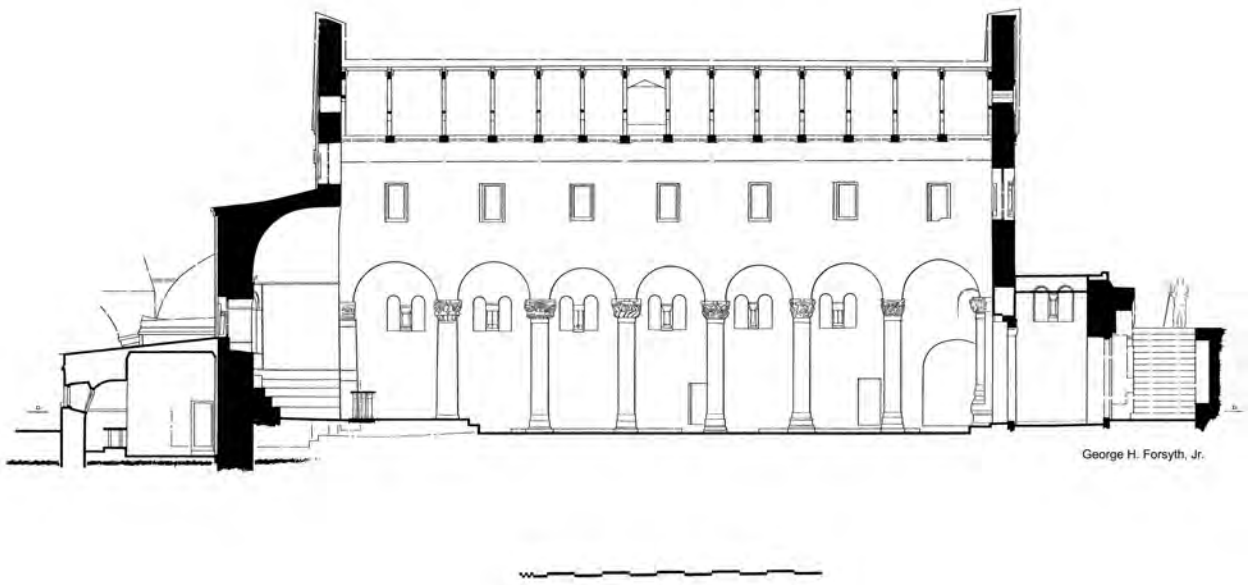


FIG. 8. Drawing by George H. Forsyth, longitudinal section of the basilica, Monastery of St. Catherine, Mount Sinai (drawing no. 637), Ilene H. Forsyth collection (scan: University of Michigan)

FIG. 9. Drawing by George H. Forsyth, cross-section of the basilica highlighting the east end, Monastery of St. Catherine, Mount Sinai (drawing no. 649), Ilene H. Forsyth collection (scan: University of Michigan)

The Expeditions

In 1956 Forsyth led a preliminary reconnaissance mission in the Near East that culminated in a visit to the Monastery of St. Catherine at Mount Sinai. He invited Kurt Weitzmann, from Princeton, to join him and colleagues from the University of Michigan for the final leg of the journey. Forsyth and his team were able to spend only five days at Sinai on this first trip. Weitzmann, who had long wished to study at first hand the monastery's holdings in manuscripts and icons, stayed on for several more weeks. On the basis of this initial experience, seeing great potentials, Forsyth and Weitzmann set up a long-term collaboration between their respective universities which would lead to the ambitious enterprise that came to be known as the Michigan-Princeton-Alexandria Expeditions to Mount Sinai.[2] Dean Charles Odegaard at Michigan and Professor Rensselaer W. Lee, then Chair of the Department of Art and Archaeology at Princeton, provided essential administrative and financial backing. In consequence, four additional full-scale campaigns, each lasting approximately three months, were carried out during the years 1958, 1960, 1963, and 1965. The University of Alexandria joined the alliance in 1958 and the distinguished Islamicist Ahmed Fikry was brought in as a major participant.[3]

While the members of the team varied from year to year, Forsyth, Weitzmann, and several others, notably the superb photographer Fred Anderegg, director of Photo Services at Michigan, formed the core. Anderegg oversaw the photographic campaigns at the heart of the mission and managed the challenging logistics of transporting equipment and establishing a photographic laboratory in the desert, where water was brackish and scarce. Working with Forsyth, moving with tripod from one vantage point to another, he photographed all accessible parts of the monastery complex, from the *souterrains* to the roof of the church, documenting features of the architectural fabric as well as interior furnishings. To photograph portable objects—Weitzmann's domain—Anderegg set up an open-air studio on an upper terrace, taking advantage of the excellent light and the low humidity (at over 5000 feet). Several aides assisted him, including John Galey, of Basel, who, during the 1963 and 1965 expeditions, devoted himself primarily to photographing icons.[4] Scholars with varying kinds of expertise joined the team for short periods. Robert Van Nice came from Dumbarton Oaks for a month during both the 1958 and the 1960 campaigns to help Forsyth with the architectural survey of the Justinianic complex, and in 1958 Professor Ralph Berry from Michigan's Department of Civil Engineering contributed his expertise. Professor Ihor Ševčenko, then of Columbia University, participated in the campaigns of 1960 and 1963 as an expert in epigraphy and paleography. Paul Underwood, a member of the resident faculty at Dumbarton Oaks, came to study the apse mosaics in 1960, after Ernest Hawkins had completed essential cleaning and preservation.[5]

2 A summary account of this history is provided in G. H. Forsyth and K. Weitzmann, with I. Ševčenko and F. Anderegg, *The Monastery of Saint Catherine at Mount Sinai: The Church and Fortress of Justinian* (Ann Arbor, 1973), 2–3 (for more on this seminal volume, see below, n. 12; see also n. 4); and in Forsyth's article of the same title published in *DOP* 22 (1968): 1–19. For personal accounts and documentary photographs, see "Island of Faith in the Sinai Wilderness," *National Geographic* 125 (January 1964): 82–104. Weitzmann describes his part in the venture in "The Contribution of the Princeton University Department of Art and Archaeology to the Study of Byzantine Art," in *Byzantium at Princeton*, exh. cat., Firestone Library, Princeton University, 1 August–26 October 1986, ed. S. Ćurčić and A. St. Clair (Princeton, 1986), 11–30; and in his autobiography, *Sailing with Byzantium from Europe to America: The Memoirs of an Art Historian* (Munich, 1994), 253–95.

3 Gracious help came from colleagues and friends in and from Egypt: Professor Aziz Suryal Atiya, then of the University of Utah, who had participated in the Library of Congress Expedition to the monastery in 1950; Dr. Fawzi el-Fakharani; Dr. Samy Shenouda; and Dr. Abdo Daoud were all instrumental to the work. Within the Egyptian government, many supporters sanctioned the enterprise and fostered its benevolent reception, notably His Excellency Dr. Naguib Hashem, then Minister of Education; Dr. Mohamed Kamel Nahas; His Excellency Dr. Abdel Aziz el-Sayed, Minister of Higher Education in 1960 and Rector of the University of Alexandria; Mr. Mohamed Kamel Siddik, then executive secretary of the University; Dr. Abdel Fattah Mohamed; and Professor Mohamed Awwad Hussein.

4 Many of Galey's photographs appear in Weitzmann's *The Monastery of Saint Catherine at Mount Sinai: The Icons* (Princeton, 1976). On his own initiative, Galey published a picture book, *Sinai and the Monastery of St. Catherine* (London, 1980), and persuaded Forsyth and Weitzmann to contribute essays. Forsyth's text, "The Monastery of St. Catherine at Mount Sinai: The Church and Fortress of Justinian," 49–64, includes updated versions of his plans of the monastery and church.

5 Hawkins's consolidation and cleaning of the mosaics in 1959 and 1960 revealed their initial splendor. More recently, in 1999 and 2006, the Getty Foundation provided funding to allow a team of

In 1963 Hawkins returned to undertake the cleaning of the newly discovered Jephthah panel, painted in encaustic on the marble revetment of the sanctuary.[6] A stream of distinguished visitors passed through to study the treasures and offered opinions.[7]

I had the good fortune to be a member of the 1960 expedition.[8] This was an especially significant season: eight specialists convened at Sinai that summer, the campaign carefully orchestrated in advance. It is on record that some four tons of supplies, including vehicles, equipment (photographic, survey, and archaeological), generators, scaffolding, and three months' worth of provisions (3000 dehydrated meals) had been shipped ahead from Ann Arbor to Alexandria.[9] Travel was arduous and uncertain. There were no true roads beyond the Red Sea, and we drove, two or three per vehicle, accompanied by a heavy desert truck (with University of Michigan seals on either side) equipped with a winch to pull us out should we become stuck in the sand. Conditions at the monastery were Spartan. We lived in the hospitality wing in bare rooms with cots and a basin, and gathered for meals in a sitting room at the end of the corridor. Bedouins cooked the dried food we had brought with us; occasionally the monks would make us a present of fresh vegetables grown in the small monastery garden. We boiled the water that came from cisterns and the so-called Well of Moses, purifying it with iodine pills.[10] The Sinai donkey and the sound of the semantron awakened us around 4:00 a.m., and people were at work by 6:00. My particular task was to assist Underwood, and each morning we would climb the four-story scaffolding brought from Michigan to scrutinize the apse mosaics, inch by inch, using floodlight and magnifying glass, while I recorded our observations.[11]

The Sinai venture was often called a "recording mission." Forsyth and Weitzmann divided the tasks: Forsyth was responsible for architecture, Weitzmann for icons and all figural imagery: there was some small

conservators and technicians to undertake necessary conservation of the mosaics both in the apse of the church and in the Chapel of the Burning Bush: http://www.getty.edu/foundation/initiatives/past/arch_and_museum_conservation/arch_conservation.html (accessed 4 August 2016).

6 Weitzmann describes the discovery of the painting of the Sacrifice of Jephthah's daughter—a pendant to the image of the Sacrifice of Isaac on the corresponding pilaster to the left of the apse—and Hawkins's restorations in "The Jephthah Panel in the Bema of the Church of St. Catherine's Monastery on Mount Sinai," *DOP* 18 (1964): 341–52.

7 A. H. S. and Elektra Megaw, Erica Cruikshank Dodd, and Dorothy Shepherd were among the guests. Special assistance was given by the conservator Carroll Wales, Mr. Margaritoff of the Byzantine Museum in Athens, Constantine Cuasis, Grace Durfee, Walter Grunder, and Maiteland R. Lamotte. The expeditions were particularly honored by the visits of Mr. and Mrs. Robert Woods Bliss and Mr. and Mrs. Eugene Power. The support of Richard Burleigh, then of the British Museum, Gerald Carr, Richard Crane, Lois Drewer, James Griffin, Thomas Mathews, A. H. S. Megaw, Dean McKenzie, Robert Sisson, and John Thacher was particularly valuable. Scholarship will ever be in debt, however, to the monks at Sinai and their religious officers: His Beatitude, Porphyrios III, who graciously authorized the inception and continuation of the project; the learned Father Gregorios, his successor, who helped further it; His Eminence, Monsignor Damianos, who, as Archbishop at Mount Sinai, was unfailing in his warmth of mind and spirit toward the project; Father Dionysios, former librarian at the monastery; and Father Nikophoros, along with all the monks who received the visiting scholars so graciously during the years of the expeditions. Bedouin assistants, too, did much to further the enterprise. Forsyth was happy to acknowledge the assistance of all.

8 My time "at the mountain" came shortly after my marriage to George Forsyth (June 1960) and a year before I moved from a position on the faculty of art history at Columbia University to one at Michigan.

9 Described by Forsyth in "Island of Faith," 95–96. The papers of Robert Van Nice, housed in Dumbarton Oaks, include, among the letters from Forsyth, a copy of the eleven-page inventory of the fifty-seven packing cases sent over in 1960. See post by J. Cebra https://icfadumbartonoaks.wordpress.com/2013/04/02/reminiscing-over-sinai/ (accessed 4 August 2016).

10 An important member of the team was Anderegg's photographic assistant, Grace Durfee, who, having medical training, doubled as a nurse. Learning of her presence, the Bedouins would bring their sick to the monastery for treatment; children were carried up by the windlass. In the mornings, as dawn was breaking, one could look down to see their camels camped at the foot of the wall. Once a week a dole of bread that the monks had baked would be lowered down for the Bedouin camped below.

11 The goal was to determine precisely how the figures had been modeled, how the semblance of plasticity had been achieved through the color and setting of the tesserae, and, especially, how the vivid corporeality of Christ in the Transfiguration had been accomplished. We discovered that only eight colors had been used, varying in hue through changes in value. A Princeton-trained Byzantinist, Underwood had been working on a reconstruction of Justinian's Church of the Holy Apostles in Istanbul before the Sinai venture; his long studies of the Kariye Djami would be published in four volumes (New York, 1966–75). He never published his notes on Sinai, though Weitzmann incorporated certain observations into his "Mosaics and Wall Paintings," in *Sinai: Treasures of the Monastery of Saint Catherine*, ed. K. A. Manafis (Athens, 1990), 61–72, at 66.

contention over which of the two would publish the apse mosaics, as the cycle was at once architectural and representational. The expeditions yielded a rich archive of visual and epigraphic information, catalogued and now housed at Michigan, with additional holdings at Princeton. Just two volumes in the proposed series of publications appeared: *The Monastery of Saint Catherine at Mount Sinai: The Church and Fortress of Justinian*—a volume of Anderegg's photographs with introductory texts by Forsyth and Weitzmann and a short contribution on inscriptions by Ihor Ševčenko—published by the University of Michigan Press in 1973;[12] and the first volume of Weitzmann's *The Monastery of Saint Catherine at Mount Sinai: The Icons*, treating works from the sixth to the tenth century, published by Princeton University Press three years later.[13] Before his death in 1991, Forsyth had completed his ambitious architectural survey of Sinai's structures. He left behind dozens of finished, measured drawings incorporating the fruits of years of on-site and offsite analysis, accurate witnesses to the state of the fortified monastery of St. Catherine at one point in its 1400-year history.

Career

The Sinai project was the last and largest venture in Forsyth's archaeological career. When he led the exploratory expedition to the monastery of St. Catherine in 1956, he was at a turning point in his academic life. In 1953, his book, *The Church of St. Martin at Angers: The Architectural History of the Site, from the Roman Empire to the French Revolution*, was published by the Princeton University Press, accompanied by a folio album of measured drawings based on excavations he had directed in Angers from 1926 to 1936. Publication was delayed because of his service as lieutenant in the U.S. Navy in the 1940s,[14] and then by his efforts to build a strong department of art history at the University of Michigan after becoming chair in 1947.[15] By the early 1950s, he was ready to consider taking up a new archaeological project of some scope and turned to the architectural heritage of the Near East, an interest dating back to his time studying with Howard Crosby Butler at Princeton. During a solo trip in 1954 he revisited famous as well as relatively obscure sites: Jerusalem; Bethlehem; Jericho; Petra; less familiar parts of Turkey, Lebanon, and Syria; and, most fruitfully, Cilicia (e.g. Alahan, Kanlıdivane, Korikos, and Meriamlik in Armenian Cilicia). Articles documenting the results of his investigations on this trip, particularly regarding Alahan Kilisse,[16] announced the shift in his focus away from Europe, and in 1957 he joined the team of Byzantinists studying the Kariye Camii in Istanbul.[17] In 1955 he was awarded the Haskins Medal by the Medieval Academy of America for *The Church of St. Martin at Angers*, and, in the early months of that same year, he was invited to return to the Department of Art and Archaeology at Princeton, where he had taught for some years, now as its chair. He

12 This is a folio volume, containing 198 plates: Forsyth's idea was to arrange the photographs to suggest an itinerary through the monastery. He contributed the essay "Introduction to the Architecture," 5–10; Weitzmann, "Introduction to the Mosaics and Monumental Paintings," 11–18; and Ševčenko, "The Inscriptions," 19–20.

13 On the ambitious publishing plan, see Forsyth and Weitzmann, *The Monastery* (1973), 1–2; R. S. Nelson, "Sinai Studies: An Overview and Introduction," in *Approaching the Holy Mountain: Art and Liturgy at St Catherine's Monastery in the Sinai*, ed. S. E. J. Gerstel and R. S. Nelson (Turnhout, 2010), 12–13. A further volume, not specifically tied to the expedition, came out a good deal later: K. Weitzmann and G. Galavaris, *The Monastery of Saint Catherine at Mount Sinai: The Illuminated Greek Manuscripts*, vol. 1, *From the Ninth to the Twelfth Century* (Princeton, 1990).

14 Forsyth's chief project during his service in the U.S. Navy was to devise and implement a scheme for distinguishing enemy aircraft; it was integrated into the Recognition Training Program.

15 Forsyth came to Michigan to expand the Department of Art History in 1947; he served as chair until 1961, directed the Kelsey Museum of Archeology until 1969, and then held the title of Research Professor of Archaeology until his retirement in 1972. Forsyth was responsible for recruiting onto the faculty Max Loehr and Oleg Grabar, specialists in Chinese and Islamic art respectively, both of whom would join the faculty of Harvard University later in their careers. Among a number of others, he brought to Michigan the Princeton-trained specialist in Italian Renaissance art Marvin Eisenberg, who would chair the department for a decade.

16 G. H. Forsyth, "Architectural Notes on a Trip through Cilicia," *DOP* 11 (1957): 223–36; idem, "An Early Byzantine Church at Kanlıdivane in Cilicia," in *De Artibus Opuscula XL: Essays in Honor of Erwin Panofsky,* ed. M. Meiss (New York, 1961), 127–37. See now M. Gough, *Alahan: An Early Christian Monastery in Southern Turkey,* ed. M. Gough (Toronto, 1985); S. Hill, *The Early Byzantine Churches of Cilicia and Isauria* (Aldershot, 1996).

17 For Forsyth's work at the fourteenth-century Byzantine church, see R. G. Ousterhout, "(Re)Presenting the Kariye Camii: Architecture, Archaeology, and Restoration," in *Restoring Byzantium: The Kariye Camii in Istanbul and the Byzantine Institute Restoration*, ed. H. A. Klein with Ousterhout, exh. cat., Ira D. Wallach Art Gallery, Columbia University (New York, 2004), 32–42, at 37–38; and cat. no. IV–1.1, pl. 33.

decided to remain at Michigan, where his research had been generously supported and where he believed that his future scholarly ventures could best flourish.

At the conclusion of the joint reconnaissance mission, it became evident to Forsyth that the structures at the monastery of St. Catherine would provide an ideal subject for intensive investigation. Though the site was not quite Syria, it seemed clear to him that the church derived from "the brilliant architectural milieu of Syria and Palestine."[18] Its well-preserved original inscriptions, naming not only its master builder, Stephanos of Aila, but also its patrons, Justinian and Theodora (deceased), supported a date of 548–65, at the height of the Justinianic Golden Age, and the fact that Procopius included an account of the building of the monastery and fortress in his *Buildings*, completed ca. 560, narrowed the date even further.[19] The study, he felt, would throw important new light on the building practices of the early middle ages.

Seeds of interest in the Near East had been planted early in Forsyth's life. At Princeton he had been a student in Butler's famous course on early Christian architecture, which featured the scholar's extensive work on Syrian churches, documented in a plethora of photographs.[20] Butler gave it for the last time during the 1921–22 academic year and died the following summer. Forsyth, an undergraduate at the time, was an unlikely candidate for admission to the class, but a generation earlier his father had studied with Butler and that connection helped. Captivated by Butler's mode of study and intense commitment to structures located in the wilds of Anatolia and Syria, Forsyth was determined to visit the region. After his graduation and before he undertook graduate study in the School of Architecture at Princeton, he embarked on a year of research travel and spent much of it following Butler's trail (fig. 10).[21] In the fall of 1924 he made an extensive tour of Upper Egypt and was then joined by Richard Stillwell, a close friend who also trained in architecture at Princeton; the two traveled on to Beirut, Baalbek, and Damascus, sharing adventures. At Christmastime, the young men and their guides, heading for Palmyra and further sites in Syria, were caught in a snowstorm that obliterated all tracks through the desert; for

FIG. 10. Forsyth with tripod during a trip to the Near East, 1924, Ilene H. Forsyth collection (photo: University of Michigan)

18 Forsyth, "Monastery" (1968) (n. 2 above), 18.

19 Procopius, *Buildings* 5.8; ed. and trans. H. B. Dewing and G. Downey, Loeb 7 (Cambridge, 1954), 355–57. Some would now date the text before May 558, since Procopius does not mention the collapse of the dome of Hagia Sophia. See J. Elsner, "The Rhetoric of Buildings in the *De aedificiis* of Procopius," in *Art and Text in Byzantine Culture*, ed. L. James (Cambridge, 2007), 33–57, at 35.

20 H. C. Butler, *Publications of an American Archaeological Expedition to Syria 1899–1900* (New York, 1903–14); idem, *Publications of the Princeton University Archaeological Expeditions to Syria 1904–1905 and 1909 (Leiden, 1907–49);* idem, *Early Churches in Syria, Fourth to Seventh Centuries*, ed. and completed by E. B. Smith (Princeton, 1929).

21 Forsyth's connections with Princeton were long-standing. He received his A.B. in 1923 and his M.F.A. in 1927, and taught there as an Instructor and then Assistant Professor from 1927 to 1942.

some days they relied on the hospitality of a garrison of French officers stationed in a mud-brick khan at their outermost Palmyrene post. Despite the bitter cold, Forsyth undertook an intense study of the ruins, recording observations, making sketches, and taking photographs. Traveling back to Europe on the Orient Express, he wrote out a 110-page description of the experience.[22] Forsyth had been particularly stimulated by his chance encounter with a stranger who turned out to be one of Butler's former guides, Khalil Coudsy, with whom he shared a car in a caravan near Keratin. With youthful enthusiasm he entertained the prospect of a sustained expedition of American scholars to the desert churches, using Khalil as guide and caretaker of the day-to-day logistical needs. In a long, detailed letter to his close friend back in Princeton, Albert (Bert) M. Friend, Forsyth lyrically outlined possible investigations in the area.[23] In the early months of 1925 he went on to visit various sites in Greece and finally journeyed back to western Europe for sustained travel in France during the spring and summer of that year. As always, he made detailed drawings and jotted down long descriptions as he went; he wrote to Friend, "I sketch as often as I brush my teeth, only oftener." Within a year Forsyth had shifted his professional focus to France. At the Romanesque *collégiale* in Angers, he launched the first serious archaeological work of his career with a series of excavations that were to occupy him for more than a decade. The early experiences in the Syrian desert in 1924, however, had made an indelible mark.

Method

For Forsyth, like Butler before him, the process of surveying and drawing with the goal of producing a finished measured drawing of a site or structure was key to understanding its essential qualities. Forsyth's drafting skills had been fostered by his father,[24] and were more fully developed at Princeton, where there was a close relationship between the training of architects and the study of architecture as a part of the history of art.[25] Butler was convinced that archaeological excavations could serve to document the history of style and to make the history of architecture palpable, and he considered drawing essential for historians; he taught a course at Princeton on "historical drawing" and he stressed the "subjects of construction, design and architectural details" in his other courses.[26] This tradition would be continued at Princeton in the teaching of E. Baldwin Smith and others, including Richard Stillwell, Donald Drew Egbert, and Forsyth himself, who in the 1930s was sometime teacher of Smith's course on architectural ornament. The longtime chair of the Department of Art and Archaeology, Charles Rufus Morey, maintained that inasmuch as architecture was a manifestation of history, its study was a humanistic endeavor and that McCormick Hall should provide a "humanistic laboratory" where its meaning could be probed.[27] Forsyth's early letters indicate that he was heir to such views and also that in his thinking regarding Asian and classical forms of art, both in relation to one another and as sources for the Christian art that succeeded them, he (along with Butler, Morey, Friend, and, earlier, Allan Marquand) had absorbed the thought of such scholars as Charles-Jean-Melchior de Vogüé and Josef Strzygowski.[28] Some early training in engineering (insisted upon by his father), his later, formal study of surveying, and his work for the government during the war years (with the United States Geological Survey), as well as his own inclination toward exceptional scholarly meticulousness, gave him skills in which he was rightly confident. Forsyth found in Georges Tchalenko, architect for the

22 Preserved among the Forsyth papers.

23 Friend made Forsyth his literary executor and left his library and papers to him; their correspondence is preserved among the Forsyth papers.

24 Until his death, Forsyth used drafting instruments once presented to him as a birthday gift by his father.

25 The School of Architecture was inaugurated under Butler as a section of the department in 1919 and was still located in McCormick Hall in 1927–28. See D. Van Zanten, "Formulating Art History at Princeton and the 'Humanistic Laboratory'," in *The Early Years of Art History in the United States,* ed. C. H. Smyth and P. M. Lukehart (Princeton, 1993), 175–82, at 176.

26 M. A. Lavin, *The Eye of the Tiger: The Founding and Development of the Department of Art and Archaeology, 1883–1923, Princeton University* (Princeton, 1983), 18–19.

27 Van Zanten, "Formulating Art History," 180–81; C. H. Smyth, "The Princeton Department in the Time of Morey," in *The Early Years of Art History*, 37–42; idem, "Concerning Charles Rufus Morey (1877–1955)," in ibid., 111–21.

28 Le Comte de Vogüé, *Syrie centrale, architecture civile et religieuse du I^er^ au VII^e^ siècle* (Paris, 1865–77); J. Strzygowski, *Orient oder Rom* (Leipzig, 1901); cf. C. R. Morey, "The Sources of Mediaeval Style," *ArtB* 7 (1924): 35–50.

Syrian Archaeological Service,[29] whom he had come to know during a visit to Bélus in southern France, a colleague whose skills in this sphere he could admire without qualification. In May 1954, he wrote to Friend from Aleppo: "He [Tchalenko] is the only man I will acknowledge to be a more careful surveyor and draftsman than myself."[30]

At Sinai Forsyth was faced with a dauntingly irregular agglomeration of buildings in various stages of decrepitude. Fourteen centuries of uninterrupted community living meant that there was a thick overlay of encrustations on the Justinianic core. In addition, there was the sheer size of the site. The monastery's acreage resembled that of an entire city block, and its varied functions made it the equivalent of a modestly sized town.[31] Forsyth seems to have relished the enormity of the challenge before him.

It had been his initial intention to carry out excavations at the site, notably in the area of the Burning Bush Chapel, east of the main apse of the basilica. Here he hoped to find traces of a presumed earlier church or chapel and thereby to resolve the question of whether the pilgrim Egeria might possibly have seen a Constantinian structure at this spot. In her *Peregrinatio*, now generally dated to the 380s, she describes her descent from the summit of Mount Sinai, on its eastern side, to the site of the Burning Bush, which she says is located in a very pretty garden with a church behind it.[32] Forsyth took archaeological equipment to the monastery in the fall of 1960 in preparation for sinking trenches at the eastern end of the church but had to abandon all hope of excavation when, on 1 October, an order came down from the Archbishop forbidding digging of any kind. Although the monks had been unfailingly gracious about other matters, on this new rule they stood firm. Forsyth was now forced to limit his work to a surface survey,[33] but he was soon greatly gratified by the yields from his subsequent exploration of the elaborate subterranean foundations of the fortress (fig. 11), which he described in an October letter as Piranesi-like in effect ("magnificent, eerie, great and dimly-lit spaces, laced with sixth-century arches which carried the terracing above").[34] He was also exhilarated to find the "original aqueduct which drained rainwater out under the fortification walls from the interior of the fortress." These *souterrains* were to prove critical to his objective of determining the rationale of the original Justinianic design and thereby throwing light on the standing question of the intersecting functions of the complex: monastic enclave, defensive fortress, and pilgrimage shrine.

Forsyth also had to abandon his hopes for making use of recent technology in carrying out his work. His expectations had been high when he invited the Michigan engineer Ralph Berry to join the 1958 expedition, but the anticipated photogrammetric survey did not materialize. Instead Forsyth fell back on traditional surveying techniques. He proceeded to establish reference marks as survey points within the complex, which

29 Director of the mission of the French Archaeological Institute in northern Syria, Georges Tchalenko was responsible for *Villages antiques de la Syrie du Nord*, 3 vols., Institut Français d'Archéologie de Beyrouth, Bibliothèque Archéologique et historique 50 (Paris, 1953–58). On Tchalenko's work in Syria see C. Foss, "Dead Cities of the Syrian Hill Country," *Archaeology* 49 (September–October 1996): 48–53, at 50–51.

30 Forsyth papers.

31 Indeed in 1839 David Roberts noted in his travel account that Sinai resembled a small town. See *Jerusalem and the Holy Land Rediscovered: The Prints of David Roberts (1796–1864)*, ed. W. D. Davies, E. M. Meyers, and S. W. Schroth (Durham, NC, 1996), 340. This volume contains a reprint of Roberts's 123 lithographs as published under the title *The Holy Land, Syria, Idumea, Arabia, Egypt, and Nubia* (London, 1842–44), with the commentary of Reverend George Croly.

32 *Itinerarium Egeriae* (*Peregrinatio Aetheriae*) 1.1–5.12, at 4.7, ed. O. Prinz (Heidelberg, 1960), 1–8, at 6: "Ante ipsam autem ecclesiam hortus est gratissimus, habens aquam optimam abundantem, in quo horto ipse rubus est"; trans. J. Wilkinson, *Egeria's Travels* (Jerusalem and Warminster, 1981), 91–98. The standard translation when the Michigan-Princeton-Alexandria Expeditions took place was *The Pilgrimage of Etheria*, ed. and trans. M. L. McClure and C. L. Feltoe (London, 1919). See also J. M. Braun, "St. Catherine's Monastery Church, Mount Sinai: Literary Sources from the Fourth through the Nineteenth Centuries" (PhD diss. [Library Science], University of Michigan, 1973) now superseded in part by D. F. Caner, *History and Hagiography from the Late Antique Sinai*, Translated Texts for Historians (Liverpool, 2009).

33 During the long course of his work on the project, Forsyth was able to study inaccessible parts of the complex through more recent photographs, including some taken after the fire in the northeastern part of the monastery that occurred on 30 November 1971. Dean McKenzie, who visited the monastery in 1973, and Fred Anderegg, who returned to Sinai in 1980 after the post-Byzantine Chapel of St. George had been rebuilt, provided photographs, and others were published by Jordan Dimacopoulos in "Observations on the Architecture of St. Catherine's at Mount Sinai," *Δελτ.Χριστ.Ἀρχ.Ἑτ.*, ser. 4, vol. 9 (1977–79): 261–301 (in Greek; English summary, 297–301).

34 Letters to Ilene Forsyth (Forsyth papers).

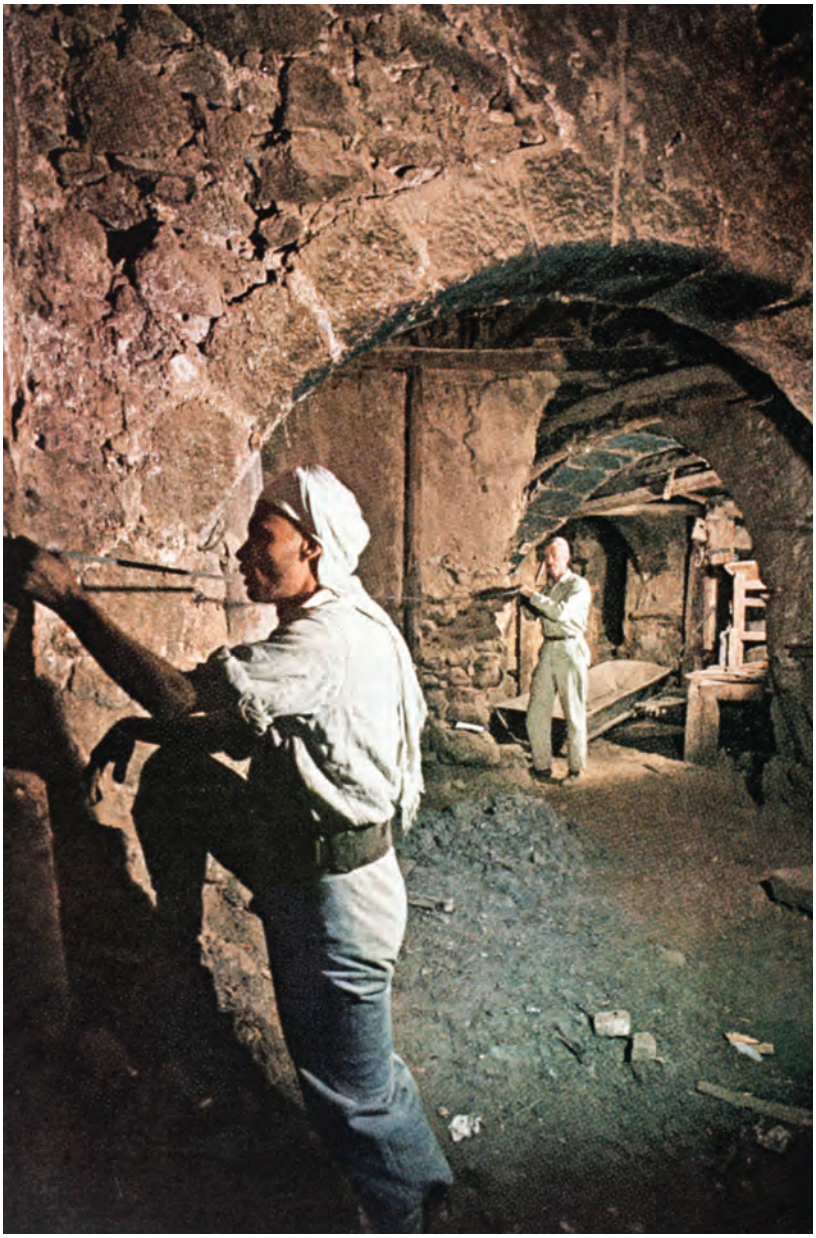


FIG. 11.
Forsyth and a Bedouin assistant at Sinai measuring the supporting arches in the *souterrains* (after *National Geographic* 125 [Jan. 1964]: 98)

he would use over several seasons. With the help of Robert Van Nice during the 1958 and 1960 campaigns, he gathered sheaves of survey data. In 1965, when the final critical surveying and measuring of the subterranean foundations were to be undertaken, Forsyth arrived at Sinai expecting to work with architectural surveyors from the University of Alexandria; by early October of that season, when it became clear that help would not be forthcoming from this quarter, he conceived the alternative of training Bedouin assistants. In a letter of 6 October 1965 he writes: "I'll post Bedouins with stadia rods on every one of [the] original reference marks (fortunately marked with paint) and survey by plane table, using them as bearings, like live pawns in some kind of monstrous chess game."[35] On 19 October he describes his work with a particularly able aide, Ahmed Manoli. He reports managing well by marking his detailed photographs with a red grease pencil to

35 Ibid.

indicate the exact places where Manoli was to hold the stadia rod. On 20 October he writes that he has laid out a new base line on the roof and is also still working in the *souterrains*. On 25 October he notes the shortening of the days and the slowing of his work: "The sun has swung so far south, behind Mount Sinai, that now we have sundown at 2 P.M., followed by chill winds that tremor the instruments and make fingers stiff." Still he says that the work is coming along and he expects to have the essentials of the fortress recorded by the time of his departure in another three weeks. He continues to work with Manoli: "It is slow and requires a lot of running around to 'position' him, but we are moving under our own power." On 30 October, as cold was beginning to grip the mountain, he writes of his difficulties in coping with the weather: his fabulous "new instrument is almost too sensitive. Imagine trying to read a rod to the millimeter all the way across the monastery. But that millimeter makes a difference of 10 centimeters in [that] distance. Heat waves make it dance and a breeze is like an earthquake." Even so, he notes, the survey is going "somewhat better." On 3 November, he writes: "the survey of the fortress is beginning to take shape. It has required so much improvisation." An annex to the "Mosque" had turned up and he planned "to plane table it" the next day. He was also pleased to have been authorized by the monastery to subject to carbon-14 tests portions of wood from the church.[36]

Season after season, as he collected preliminary field survey data, Forsyth was making analytical sketches and descriptive notes in his field books (fig. 12). The sketches were of different sizes and scales, often rendered freehand, with measurements indicated. Even tiny drawings and their accessory notes, he was aware, would later serve him as thinking aids. Typically he worked alone when executing them, maintaining precarious balance on a ladder. He favored a small ring binder and devised a numbering system that allowed him to return repeatedly to his data to make additional entries as the analysis advanced: when further information became available or as his understanding deepened, he would amend his entries. The additions make some of the pages read like heavily glossed medieval manuscripts. Since he carefully dated all his observations, the resulting palimpsests document the self-corrective method that enabled him to determine the articulation of the plan at chief intersections of the complex's many systems and, ultimately, to reconstruct these in his drawings. Interesting examples include the truss of the church's roof; the hinges and pivots of its doors; the oven, grist mill, and olive press in the domestic quarters; the fenestration of the outer fortress walls; and, most especially, the handling of the fortress's hydraulics.

Upon his return to his drafting table in Ann Arbor, the work of producing the measured drawings began. Forsyth used conventional drafting instruments to transform the data gathered at Sinai into rough preliminary surveys, then into preliminary sketches, then into preparatory drawings on mylar, and finally into scaled, finished mylar drawings that incorporated all of the insights gained along the way (figs. 3–9). Due to the exceptional nature of the site, with its terraced configuration and numerous but irregular levels and its strategic incorporation of native rock into parts of the design, any vision of the whole had to be suspended until the laborious process of piecing these bits together was complete.

To aid him in this synthesizing process, Forsyth relied upon a quantity of detailed photographs of the site. From the outset he had insisted upon controlled and comprehensive photographic campaigns, fastidiously marking out positions for the photographers and their tripods, and indicating vantage points and angles of view. Before providing preliminary guidelines for Anderegg's team, Forsyth did considerable reconnaissance, noting the position of the sun at various times of day, seeking ways to capture images that would highlight particular features of the structures, such as masonry details, or bring out subtleties obscured in dim light. He noted the ideal hours (within fifteen-minute intervals) as well as the sizes of the lenses and preferred focal lengths. His work alongside Anderegg ensured the exactitude of the record he believed essential to the interpretative phase of his study (fig. 13). Forsyth checked and updated his *desiderata* lists regularly, aiming to improve quality and fill in lacunae. The films were immediately developed and printed in the monastery laboratory, to eliminate the dangers of deterioration that would have occurred had they been shipped across the desert for processing, and to facilitate revisions, should they prove necessary. Another of Forsyth's practices, both on-site and in Ann Arbor, was to mark photos in grease pencil to indicate places where he had

36 See fig. 12 and n. 78 below.

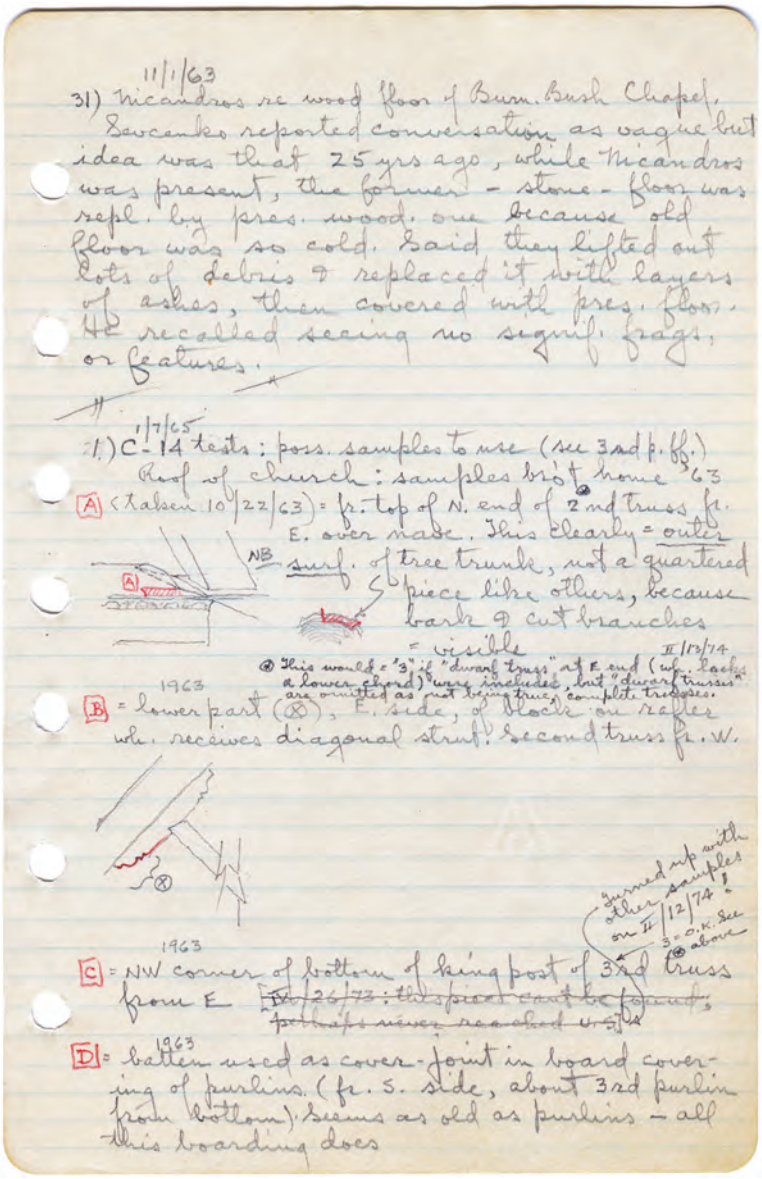

11/1/63
31) Nicandros re wood floor of Burn. Bush Chapel.
Savcenko reported conversation as vague but
idea was that 25 yrs ago, while Nicandros
was present, the former - stone - floor was
repl. by pres. wood. one because old
floor was so cold. Said they lifted out
lots of debris & replaced it with layers
of ashes, then covered with pres. floor.
He recalled seeing no signif. frags.
or features.
1/7/65
1.) C-14 tests: poss. samples to use (see 3rd p. ff.)
Roof of church: samples brot home '63
A (Talsen 10/22/63) = fr. top of N. end of 2nd truss fr.
E. over nave. This clearly = outer
surf. of tree trunk, not a quartered
piece like others, because
bark & cut branches
= visible
NB
II/13/74
This would = "3" if "dwarf truss" at E end (wh. lacks a lower chord) were included, but "dwarf trusses" are omitted as not being true, complete trusses.
1963
B = lower part (⊗), E. side, of block on rafter
wh. receives diagonal strut. Second truss fr. W.
turned up with other samples on II/12/74 = 3 = O.K. See above
1963
C = NW corner of bottom of king post of 3rd truss
from E
IX/26/73: this piece can't be found; perhaps never recovered
1963
D = batten used as cover-joint in board cover-
ing of purlins. (fr. S. side, about 3rd purlin
from bottom). Seems as old as purlins — all
this boarding does

FIG. 12.
Page from Forsyth's Sinai field notes, Ilene H. Forsyth collection (scan: University of Michigan)

discovered that additional detailed photographs would be needed. These conscientious on-site procedures yielded thousands of crisp and informative black-and-white photographs, as well as some color Ektachrome prints.[37] During the later stages of his work, after the last of the expeditions in 1965, Forsyth would make heavy use of the photographs, in coordination with his field data. On some of them he superimposed drawings, again in erasable grease pencil, to help him puzzle out particularly recalcitrant structural issues, such as the extension of the course of a beam.

To supplement his growing corpus of newly made photographs, Forsyth also gathered up pieces of archival visual material. He especially prized early photographs, "old views," as he called them. Whereas the lithographs and engravings published by the famous early travelers to Sinai—Léon de Laborde (1836) or David Roberts (1838–39), for example—were likely to be schematic or romanticized, these early photographs provided invaluable evidence of the appearance of certain parts of the

37 These photographs now form the core of the Sinai Archive at Michigan. They were inventoried and organized in a classification system devised by Lois Drewer in the 1970s.

FIG. 13. Forsyth and Fred Anderegg photographing the inscriptions on the roof beams of the basilica, Monastery of St. Catherine, Mount Sinai, Ilene H. Forsyth collection (photo: University of Michigan)

monastery before modern refurbishing. In a number of cases they gave Forsyth his only means of access to parts of the monastery. Items in his collection included the photos made for John Shaw Smith's travel party, which made its way to Sinai in 1851 (surely the earliest photographic account of the monastery, for which Forsyth was deeply grateful to A. H. S. Megaw, a descendant); the photographs of Francis Frith, made in 1857 (said to be the "earliest" but preceded by Smith's); the photographs, and engravings, of Captains C. W. Wilson and H. S. Palmer, made for the British Ordnance Survey, 1868–69; and a series of anonymous photographs taken in 1925, 1932, and 1934, some of them housed at Olana, Frederic Church's estate in New York.[38] Those made in 1925 for the unknown architect of Sinai's modern museum wing were especially instructive, as they revealed the inner face of the original walls of the southwestern stretch of the enclosure.

For Forsyth, photographs were never a substitute for drawings. He was sometimes asked, even by close colleagues, why he went to such effort to measure and draw, in elaborate detail, architectural features such as the Sinai capitals when he might just snap the shutter of a camera (figs. 14–16).[39] But for him, the camera view was limited, recording an object at a particular moment in particular conditions from a single vantage point; his drawings (based on precisely measured data and therefore able to compensate for distortions caused by foreshortening, shadows, and so on) could serve as a more accurate and complete document. Moreover, a drawing had the capacity to illustrate a detail in a broader architectural context (for example the position of an individual capital in relation to an entire colonnade or in relation to an entire elevation; fig. 8), a feat difficult to achieve in photographs. But more than this, Forsyth believed that drawings could be sites of exploration. In the manual act of drawing with pencil on paper (he always had pencils ranging from blunt to needle sharp ready to hand), he was able to learn as he synthesized. As he moved from first on-site sketches through to finished drawings, he came to see the logic of the builders' choices. Tellingly Forsyth never signed his name to his drawings but would insert, in cross-sectional renderings, an in-scale silhouette of himself surveying the structure (figs. 8, 9).

As he developed his interpretations, Forsyth attended closely to the scant early literature on Sinai. He found H. L. Rabino's *Le monastère de Sainte-Catherine du Mont Sinaï* (1938) particularly useful.[40] Yet above all he trusted his eye, giving credence to what he could learn through studying the monument at very close range and to what he could measure and graphically reproduce. His interpretation emerged from the scrutiny of the monastery's revealed structural systems and consideration of its site-specific context: he paid heed to the tiniest details and gave thought to its broadest character, including the relationship of the monastery to the sheer cliffs of granite and the mountain range around it. He accordingly drew upon topographic relief maps, 360-degree panoramas, and NASA air views when formulating his hypotheses.[41]

As the first scholar to attempt a carefully reasoned architectural study of the site, having no tradition to build on, he was literally in uncharted territory. His time-consuming, self-corrective method was as evident in his later forays into interpretation of the data, at his drafting table in Ann Arbor, as it had been during the earlier stages of the project, when he was surveying, drafting, and gathering data on-site. If his method caused him to delay publication, it also allowed him to

38 Gerald Carr (University of Delaware), expert in the history of Olana, kindly alerted Forsyth to their existence and helped to acquire the photographs.

39 Forsyth devoted much time to the Sinai capitals—each one unique and vigorously carved in local granite, covered now with obscuring gesso—for evidence of architectural influence, finding one to be of a type employed in Syria and Mesopotamia. See Forsyth, "Monastery" (1968), 12, 15; *Monastery* (1973), pls. LXII–LXV, esp. LXV, C (both n. 2 above). More recent studies include E. G. D. Maguire, "The Capitals and Other Granite Carvings at Justinian's Church on Mount Sinai" (PhD diss., Harvard University, 1986); A. Guiglia Guidobaldi, "I capitelli della basilica giustinianea della Theotokos, oggi di S. Caterina, sul monte Sinai," in *Costantinopoli e l'arte delle province orientali*, ed. F. de' Maffei et al., Milion 2 (Rome, 1990), 265–342.

40 H. L. Rabino, *Le monastère de Sainte-Catherine du Mont Sinaï* (Cairo, 1938).

41 Forsyth kept topographic relief maps on display in his study when working. In 1973 he published a panoramic photograph as a foldout at the opening of his *Monastery of Saint Catherine at Mount Sinai*. He first presented NASA photographs of the Sinai peninsula taken from outer space in his paper at the symposium titled "Justinian and Eastern Christendom" that took place at Dumbarton Oaks, 4–6 May 1967; it was published in *DOP* the following year (n. 1 above). For a more recent use of aerial photographs see M. Kawatoko, *A Port City Site on the Sinai Peninsula, al-Tur: The 11th Expedition in 1994 (A Summary Report)* (Tokyo, 1995), pl. 42.

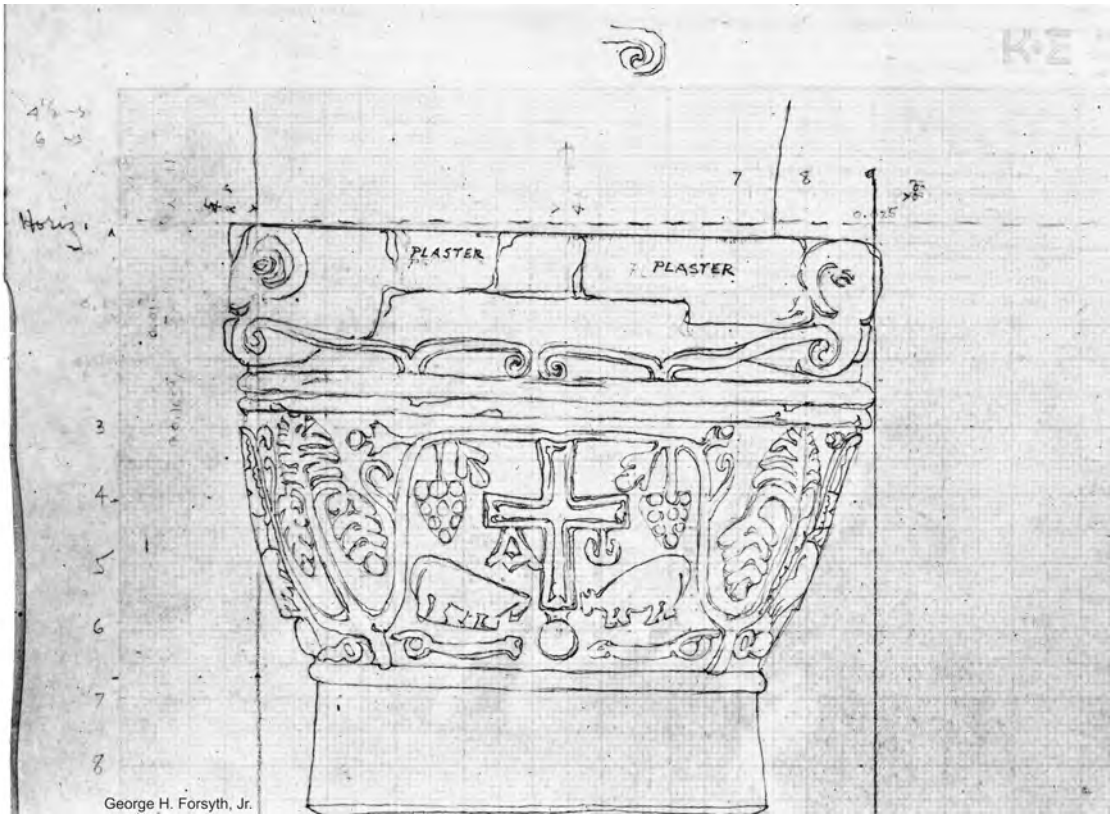


FIG. 14. Drawing by George H. Forsyth, scaled image, second capital from west in the north aisle of the basilica, Monastery of St. Catherine, Mount Sinai, Ilene H. Forsyth collection (scan: University of Michigan)

FIG. 15. Drawing by George H. Forsyth, second capital from west in the north aisle of the basilica, Monastery of St. Catherine, Mount Sinai (drawing no. 639), Ilene H. Forsyth collection (scan: University of Michigan)

FIG. 16.
Second capital from west in the north aisle of the basilica, Monastery of St. Catherine, Mount Sinai (photo: Fred Anderegg, reproduced by courtesy of the Michigan-Princeton-Alexandria Expeditions to Mt. Sinai)

change and refine his conclusions as the totality of his evidence and understanding grew. When the extremely difficult drawing of the cross-sectional cut through the entire width of the monastery was complete (fig. 6), its intimate relationship to the site was ever more fully revealed and the motivations behind puzzling features of the complex became more clear.

Analysis

Although Forsyth was inclined in his early thinking about the church to assess it in terms of the debate over origins, *Orient oder Rom*[42]—doubtless harking back to his scholarly formation at Princeton—the individuality of the architecture of the Sinai structures became steadily more apparent to him. The dichotomies posited in the older scholarly literature—paradigms setting Asian/Oriental against Graeco-Roman/Hellenistic, classical against sub-antique, urban (Constantinopolitan) against provincial, refined against rustic, imported against local—simply did not fit.[43] While he would continue to argue that the design was rooted in the Syro-Palestinian milieu, he came to focus increasingly on its distinctive features, owed to the exigencies of site, that cumulatively set it apart. Some of these had to do with fabric: the high quality of the building materials (granite quarried at the site); the relatively careful construction of its walls (composed of well-squared, uniform blocks of stone, nicely fitted, with little mortar, forming inner and outer sheaths for an invisible interior rubble core, in striking contrast to the rubble construction common elsewhere); the homogeneity of its structural fabric (extending even to its contemporary domestic quarters and its slightly later "latrine tower," and true as well for the massive arches of its terraces); the handsome forms of its architectural ornament (such as the subtle, shallow reliefs carved on the *meurtrières*, the windows, and the gables). He carefully studied the plan of the church, noting unusual features, such as the series of chapels and side chambers flanking its aisles and the lofty proportions and lighting of the chapels at the western end of the nave. He pondered the shrewdly designed truss of the church's wood roof (with its

42 On Strzygowski's controversial theses, see S. L. Marchand, "The Rhetoric of Artifacts and the Decline of Classical Humanism: The Case of Josef Strzygowski," *History and Theory* 33 (December 1994): 106–30.

43 In Forsyth's time, these concepts were not yet as thoroughly challenged as they are today.

sheathed ceiling beams prominently presenting historiated carvings and inscriptions); the refined fittings of parts of the church interior (the marble throne, revetment, and chancel screen of its sanctuary; and the stunning mosaics of its triumphal arch and apsidal semidome). Increasingly his attention was caught by the masterful handling of hydraulics, which recognized the need for collecting, storing, and distributing water, as well as managing its safe egress to mitigate the threat of potential danger and damage. As he labored over his synthesizing drawings he came to appreciate more and more the intelligent articulation of the plan, with terraces offering commodious accommodation for varied communities, stable and transient, and, most intriguingly, the elegant exploitation of native rock at significant junctures. This, he came to see, was crucial to ensuring a long life for the sixth-century monastery and preserving it relatively intact to our own time.

Not all the vexing curiosities of the complex could be readily explained: the asymmetry of the church towers, the differing pitches of the church's gables and the roof between them, and, most markedly, the differing axes of the basilican plan church and the monastery's outer enclosure walls (figs. 3, 4). Forsyth was aware how odd the lack of alignment appeared to those familiar with other early Christian monastic plans, such as that of the sixth-century Wadi Natrun, or to those expecting to find the strict symmetries and parallelisms of late Roman sites, such as the Palace of Diocletian at Split. His solution to the problem developed slowly as his understanding of the site and its functions evolved.

Early on Forsyth subscribed to the common belief that the siting of the church was dictated by a desire to feature the Burning Bush. Though always prepared to credit Procopius's statements regarding the monastic and military functions of the fortified complex,[44] he nevertheless focused a good deal of attention on the site's crucial function as a pilgrimage center, despite the fact that Procopius did not mention the bush; scholars before him had suggested that the architect's chief aim was to enshrine and honor this relic while also providing pilgrims ready access to it. Inevitably shades of the thinking that undergirded contemporary scholarly literature, including André Grabar's *Martyrium* and writings by Richard Krautheimer, Carl Kraeling, and others, can be detected in Forsyth's first publications on Sinai. In a paper delivered at Dumbarton Oaks in 1967 and published in the *Papers* in the following year, he hypothesized that a U-shaped scheme was intended to facilitate the circulation of pilgrims; his *comparanda*, including ecclesiastical structures in Bethlehem, Jerusalem, Kalat Seman in Syria, and Jerash in Jordon, also betray the state of scholarship in those years. According to this hypothesis, pilgrim visitors would have followed a route extending eastward along the side aisles of the basilica, and proceeded thence to the viewing of the bush behind the main apse (where the later Burning Bush Chapel is now located) and back again along the pendant aisle.[45] As his work progressed, and following an exchange with Thomas Mathews in the early 1980s, Forsyth came to reject the idea that Sinai was built according to a "pilgrimage plan" and to posit rather that pilgrims exited from the church on its north side and moved along the exterior of the building to view the Burning Bush at the east end.[46] Ultimately the force of his own observations turned him away from this early line of interpretation.

44 In 1988, Peter Grossmann (Deutsches Archäologisches Institut, Cairo Branch) published the first of several studies on the Justinianic complex at Sinai: "Neue baugeschichtliche Untersuchungen im Katharinenkloster im Sinai," *AA* (1988): 543–58. Reading traces, he attempted to reconstruct the two-story structures originally built on the inner faces of the perimeter. While acknowledging that the monastery was "fortress-like," he saw it rather as a place of refuge and could not imagine Procopius's "considerable garrison of troops" occupying the same space as the monks. For a summary of his views, with plans, see Grossmann, "Architecture," in *Sinai: Treasures* (n. 11 above), 29–39.

45 This is the view Forsyth put forward in "Monastery" (1968), 7–14; and later repeated in his text in Galey's *Sinai* (n. 4 above).

46 Mathews and Forsyth exchanged a series of substantive letters about the pilgrims' path and the site of the Burning Bush in late 1979 and early 1980 (Forsyth papers). On Sinai see T. F. Mathews, "'Private' Liturgy in Byzantine Architecture: Towards a Re-appraisal," *CahArch* 30 (1982): 125–38, esp. 130–31, figs. 4–9 (Forsyth supplied photos and a plan of the church); the impact of Mathews's views is seen in Forsyth's entry in *The Coptic Encyclopedia*, ed. A. S. Atiya (New York, 1991), 5:1681–86 ("Mount Sinai Monastery of Saint Catherine"). Mathews's views on the function of the side chapels in the church were soon themselves the object of criticism. See Grossmann, "Neue baugeschichtliche Untersuchungen," 554. In this article Grossmann agreed with Forsyth that the current chapel of the Burning Bush is the latest element of the church (he dated it to the late sixth or early seventh century; Forsyth did not give a date) and argued that the notion of a U-shaped pilgrimage circuit was untenable for the Justinianic era since the doors from the side chapels adjoining the chapel are also of later date. Ibid., 555–56.

Increasingly it became evident to Forsyth that the attractions of Mount Sinai were multiple and that pilgrims followed an itinerary that had to be taken into account when interpreting features of the monastic complex. Care clearly had been taken to give monumental expression to the coupling of the two *loca sancta* marking God's appearance when he made his covenant with Moses: above, the summit of the mountain, where Moses received the Tablets of the Law and, lower down, the site of the bush that burned but was not consumed, where Moses removed his sandals in obedience to God's command. The sacrosanct focal points were linked by the "Pilgrim's Stair" (fig. 17)—still in its original Justinianic form, with more than 3000 steps hewn out of the live rock of the granite cliffs that rise, almost vertically, immediately to the south of the monastery.[47] Already in a letter of 1960, Forsyth referred to the stair to the summit as the "wrist of the open hand of God."[48] As time went on, he would place increasing emphasis on the significance of the ascent of the mountain in the conceptual planning of the complex below, and he sketched in red pencil a path that led directly from the south corner of the monastery's perimeter wall to the frightening place atop Jebel Musa (the "Mount of Moses"). He intended to preface his final volume with a panoramic presentation of the Sinai mountain range in which he had marked the passage from the monastery, up the stair, through the triumphal gateways, all the way to the summit, to the place, he wrote, "where God speaks."

The first monumental granite gateway arch, contemporary with the fortress structures and mortised into the cliff as it spans the steps of the stair, formed a triumphal passage for pilgrims ascending the mountain's face into the brilliant sun at its summit. In David Roberts's time (1839), this arch marked the place where pilgrims could make confession and receive absolution from a monk before continuing their climb.[49] They then passed beneath a second arch, the so-called Gate of St. Stephen, on which, during the 1960 expedition, a damaged inscription was discovered: † Ὑπὲρ σωτηρίας τοῦ ἀββᾶ Ἰωάν[ν]ου τοῦ ἡγουμένου καὶ . . . ("For the salvation of Abba Iohannes the Abbot and . . ."). Ihor Ševčenko dated the inscription on paleographical grounds to the sixth or seventh century and suggested that the Iohannes in question might be the great John Climacus (John of the Ladder) himself.[50] This John (d. ca. 650), who had entered the Sinai community at age sixteen and risen to the abbacy, was responsible for *The Heavenly Ladder*, a classic work of monastic literature, offering spiritual exercises for monks in their ascending quests for spiritual perfection.[51] The metaphor of the *scala paradisi*, the symbolic ladder to paradise, was most powerfully evoked in the pilgrims' path at Sinai.[52] When pious visitors, having

47 These were the key sites, but the fourth-century pilgrim Egeria (n. 32 above) listed a plethora of stopping points—referred to in the Books of Exodus, Numbers, and I Kings—in a topography dotted with cells occupied by holy men. Her itinerary included the place where the Law was given and the cave where Moses stayed during his second ascent; Mount Horeb, where Elijah fled and his cave and altar; the place where Aaron and the seventy elders stood when Moses received the Law; the Burning Bush and the spot where Moses received the command to remove his shoes; the place where the Israelites waited when Moses ascended the Mount; the place where the golden calf was made and from which Moses could see the Israelites dancing about it; the place where Moses broke the first Tablets of the Law; and other sites, ending with the place where Moses constructed the tabernacle and fulfilled God's commands. See now W. D. Ward, *The Mirage of the Saracen: Christians and Nomads in the Sinai Peninsula in Late Antiquity* (Oakland, 2014), 67–91.

48 Forsyth to Ilene Forsyth, 9 October 1960 (Forsyth papers).

49 See *Jerusalem and the Holy Land Rediscovered* (n. 31 above), 352–53 (lithograph of the "Ascent to the Summit of Sinai" with Rev. Croly's commentary).

50 I. Ševčenko, "The Early Period of the Sinai Monastery in the Light of Its Inscriptions," *DOP* 20 (1966): 255–64, at 262; idem, "Inscriptions" (n. 12 above), 19–20.

51 On Climacus and the ethos of Sinaite monasticism see J. Chryssavgis, *John Climacus: From the Egyptian Desert to the Sinaite Mountain* (Aldershot, 2004); still useful is the Princeton dissertation submitted in 1947 by Weitzmann's student J. R. Martin, which was subsequently published as *The Illustrations of the Heavenly Ladder of John Climacus* (Princeton, 1954). On its genesis see Weitzmann, *Sailing with Byzantium* (n. 2 above), 161–62. On a famous late twelfth-century icon at Sinai bearing an image of the *scala paradisi* in which monks climb a ladder of thirty rungs, each corresponding to a chapter in the tract, some yanked off by the devil, see entries by K. Corrigan and B. Pentcheva in *The Glory of Byzantium: Art and Culture of the Middle Byzantine Era, A.D. 843–1261*, ed. H. C. Evans and W. D. Wixom (New York, 1997), 376–77 (no. 247) and *Holy Image, Hallowed Ground: Icons from Sinai*, ed. R. S. Nelson and K. M. Collins (Los Angeles, 2006), 245–47 (no. 48).

52 On the way that the pilgrim's experience was guided by "material and visual markers," see S. Coleman and J. Elsner, "The Pilgrim's Progress: Art, Architecture and Ritual Movement at Sinai," *World Archaeology* 26, no. 1 (June 1994): 73–89.

FIG. 17. *Ascent to the Summit of Sinai*, lithograph by David Roberts, 1842–49, Ilene H. Forsyth collection (scan: University of Michigan)

ascended the mountain, descended and entered the church below, they saw the two sacred sites dramatically and graphically linked in the gold-ground mosaics that shimmered above the spandrels of the triumphal arch crowning the sanctuary (figs. 18–20). To the left of the arch was an image of Moses removing his sandals before the Burning Bush and to the right, Moses receiving the Tablets of the Law. Just beneath these scenes, in the apse of the semidome, was the brilliant mosaic portrayal of the Transfiguration of Christ. Thus enframed, the scene of the manifestation of Christ's divinity on Mount Tabor marks the passage from the era under the law (*sub lege*) to the era under grace (*sub gratia*), with Moses and Elijah (as well as the awestruck apostles Peter, James, and John) present as witnesses.[53] Architectural design and pictorial message meshed. As Forsyth wrote: "Such perfect blending of didactic and architectural arts, each reinforcing the other, is an extraordinary example of significant form."[54]

The shift to a greater emphasis on the summit as a major component of the religious experience at the site affected Forsyth's approach to the problem of the alignment of the basilica. He began to rethink his initial assumption that the position of the church was determined by the fixed location of the Burning Bush and that the Justinianic builder was following the axis of a former church, presumably the one mentioned by the pilgrim Egeria in the late fourth century. As he progressed with his work, however, his growing awareness of the sophistication of the constructions caused him to reflect that, while Egeria had said that the bush "is alive today and throws out shoots," the precise location of the bush she saw is conjectural. The significance of the placement of the Burning Bush Chapel receded, while that of the stair and summit of the mountain grew, and the critical importance of the steep slopes adjacent to the fortress began to loom large. This would have a bearing on Forsyth's sense of the manner in which the mastermind of the complex—whether Stephanos of Aila, the named builder of the church, or another—balanced the intersecting functions of a site that was monastic, military, and a center of pilgrimage.

The buildings and their enclosing walls form a rough square, elongated and compressed. They are squeezed into a narrow valley (*wadi*) between granite cliffs on either side and appear to be clambering up the rise of the cliffs to the south (fig. 1). The pitch of these adjacent slopes surely presented a significant challenge, as well as advantages, to the architect. As Forsyth studied the outcroppings of granite that were mortised into parts of the structure, and as he followed the adjustments of levels in its terracing system, the steepness of the site clearly seemed more and more determinative with regard to the unaligned axes of the basilica and the perimeter walls. The inclusion of these outcroppings within the complex, he saw, added strength and stability; their presence revealed the soundness and stoutness of the design. Intelligent use of the native stone was evident, for example, in the incorporation of the contour of the ridge of rock along the south flank of the church into the plan for the chapels and aisles of that side of the basilica, along with the adjacent passage. This stratagem, never before observed, was revealed to Forsyth only as his survey developed. The outcroppings are evident in his drawings of the levels of the church in some of his sections and plans.[55] His cut through the monastery as a whole is particularly enlightening (fig. 6). Here Forsyth plays with the evidence of a drop to a natural table or plateau of native rock extending diagonally north beneath the current nave of the church. As the largest flat spread of rock surface available, this provided a convenient base for the basilica, oriented east–west, the largest structure within the monastic enclosure. Although it is clear that there was substantial excavation of native rock, some outcroppings were allowed to remain. They are particularly evident near the southwest corner of the church; Forsyth regarded this area as the stabilizing linchpin of the design. The siting of the church surely reduced the need for even more extensive excavation, and the

53 The literature on the mosaics is large. For a reading of these three theophanic images as a paradigm of spiritual ascent, see J. Elsner, "The Viewer and the Vision: The Case of the Sinai Apse," *AH* 17 (March 1994): 81–102. Cf. A. Andreopoulos, "The Mosaic of the Transfiguration in St. Catherine's Monastery on Mount Sinai: A Discussion of Its Origins," *Byzantion* 72 (2002): 9–41.

54 Forsyth in Galey, *Sinai*, 62–63. Little by little it became clear that the entire fabric of the building was sixth century in date. On 8 December 1963, speaking of the marble revetments in the apse, Ernest Hawkins wrote to Forsyth: "There is no getting away from the fact that the wall panels are all of one period and that they predate the mosaic" (Forsyth papers).

55 A number of Forsyth's Sinai drawings are relevant, especially drawings 624 (fig. 7, SW corner), 632; cf. 609, 653, 654 (Forsyth papers).

FIG. 18. Moses at the Burning Bush, mosaic on the triumphal arch at the east end of the basilica, Monastery of St. Catherine, Mt. Sinai, Ilene H. Forsyth collection (photo: University of Michigan)

FIG. 19. Moses receiving the Tablets of the Law, mosaic on the triumphal arch at the east end of the basilica, Monastery of St. Catherine, Mt. Sinai, Ilene H. Forsyth collection (photo: University of Michigan)

rotated position of the perimeter walls seemed similarly to exploit natural ridges of granite. The compensation for the loss of some imputed aesthetic value, owing to the consequent non-symmetry and non-parallelism in the design of the whole, represented a significant practical gain. Construction of the arcuated galleries to the north, which key into outer outcroppings, provided additional level places, such as the open plaza to the west of the church, near what Forsyth tentatively identified as the original guest house (a structure rebuilt in the eleventh century as a mosque).[56] In sum, Forsyth came to see unusual features, including the skewed axes of the church and enclosure and the "sunken" location of the church (built at the level of the court in which the Burning Bush could be visited), as, in large part, an architect's inspired adjustment to the rocky declivity of a site demanding carefully calculated terrace design.

Investigation of the natural rock led Forsyth to focus on the broad problem of water management. The unusual siting of the fortress's perimeter walls—athwart the *wadi* and locked into the native rock of the adjacent slopes—was best understood, he came to think, in combination with its complex system of terraces and *souterrains*. He recognized that, as the levels dropped down toward the north corner of the monastery, the declining

56 Forsyth, *Monastery* (1973) (n. 2 above), 8. He would continue to ponder the original function of the structure.

FIG. 20. Transfiguration, apse mosaic at the east end of the basilica, Monastery of St. Catherine, Mt. Sinai, Ilene H. Forsyth collection (photo: University of Michigan)

slope and sinking floor provided good gradients for the drainage conduits. At the same time, the steep slopes, channeling runoff, contributed to particularly dangerous conditions during flash floods. Forsyth heard about one such event while on site. The monastery's courier, Pericles Caranicolaou, had been transporting guests to Sinai when a sudden flood brought a terrifying "wall of water" rushing towards them, and he was forced to drive the car up the steep side of a gorge to avoid being swept away.[57] Forsyth recognized that controlling such flooding by means of natural channels made to serve as sluices benefited the monastery. Converging subterranean conduits led to the west–northwest corner of the fortress (fig. 5); here Forsyth uncovered a complex of sluicegates that allowed graded control of various volumes of water. Emissions could thus be stored in cisterns or channeled to the monastery gardens farther down the slope. In this way the water's dangerous force was harnessed, preventing it from undermining the perimeter walls even while collecting reserves to satisfy the communal need for this essential commodity. There was a natural spring within the stronghold, a well near the north side of the church, known traditionally as the Well of Moses. It hardly provided sufficient water for the community in the 1960s and no doubt always needed to be supplemented from the cisterns.[58] Siting the complex on the steep slopes, a bold and risky strategy, offered substantial rewards.

57 Forsyth, "Island of Faith" (n. 2 above), 96–97.

58 Forsyth drew a large camel cistern outside the fortress's perimeter wall, near the north corner (fig. 4). See also the schematized plan published by Alberto Siliotti in *Guide to Exploration of the Sinai* (Vercelli, 1994), 126.

Forsyth, of course, studied with great care Procopius's account of building during Justinian's reign. Though Procopius provided only a short description of the complex at Sinai, if considered within the context of *Buildings* as a whole, the recurrence of themes rousing Procopius's rhetorical prowess proved revealing. Marginal notations in Forsyth's personal copy of the Loeb edition of *Buildings* show him continually weighing Sinai's systems against those of structures built in other parts of the empire.[59] Procopius repeatedly commented on remarkable feats of engineering set in motion by the emperor; he was himself obviously interested in such tactical matters and especially preoccupied with hydraulics. He provides, for example, surprisingly detailed accounts of the means for controlling damaging floods, including the conduits, cisterns, and sluicegates at Daras and Antioch. In his marginal notes Forsyth indicated how these could be likened to the design at Sinai, and he did the same with cisterns, notably that of the Yerebatan Serai near Hagia Sophia in Constantinople. Procopius explains the danger of torrential rainfall undermining the foundations of fortresses as he credits Justinian's directives for managing to control these threats through the construction of aqueducts and flood gates.[60] He speaks of the advantages of building on sleep slopes (praising Justinian for his genius in recommending this practice), and at several places describes the technique of building between two cliffs by mortising construction into live rock.[61] Still, Procopius was quick to acknowledge the disadvantages: care had to be taken with regard to water and security.

Procopius described Sinai as a "precipitous and terribly wild mountain," calling the entire peninsula "unwatered" and producing no crops.[62] Eutychius of Alexandria, writing in Arabic some 400 years later, spoke of the monastery's situation "in a narrow place between two mountains" and said that Justinian rejected a site at the summit of Mount Sinai because "there was no adequate supply of water."[63] These historical discussions inflected Forsyth's interpretation of the site, leading him to consider the extent to which the design should be regarded as a project in water control.[64] His admiration for the architect grew as he uncovered the means that had been contrived to

59 Procopius, *Buildings* 5.8; Dewing–Downey (n. 19 above), 355–57. On Procopius's purposes and rhetorical stratagems, see among others: Av. Cameron, *Procopius and the Sixth Century* (Berkeley, 1985); Elsner, "The Rhetoric of Buildings in the *De aedificiis* of Procopius," 33–57; *De aedificiis: Le texte de Procope et les réalités*, ed. C. Roueché, J.-M. Carrié, and N. Duval, AntTard 8 (Turnhout, 2000); A. Kaldellis, *Procopius of Caesarea: Tyranny, History, and Philosophy at the End of Antiquity* (Philadelphia, 2004).

60 Procopius, *Buildings*; Dewing–Downey, 121 (Daras), 131 (Baras), 143 (Edessa), 151 (Zenobia), 167 (Antioch), etc.; for cisterns, 91, 113–15, 127, 167; for sluicegates, 111, 121, 169.

61 For living rock, Procopius, *Buildings*; Dewing–Downey, 91, 121, 345.

62 Procopius, *Buildings* 5.8; Dewing–Downey, 355.

63 For an English translation of the relevant passage in the *Annales* of Eutychius (Sa'id ibn Batrīq), see P. Mayerson, "Procopius or Eutychius on the Construction of the Monastery at Mount Sinai: Which Is the More Reliable Source?" *BASOR* 230 (April 1978): 33–38, at 36–37; Mayerson worked from the seventeenth-century Latin translation by Edmund Pococke reprinted in PG 111:1071–72. For recensions of the original Arabic text, published in Paris (1906–9) and Leuven (1985), see CSCO 50–51 and 471–72 (= Scriptores Arabici 6–7 and 44–45), edited respectively by L. Cheikho et al. and M. Breydy, the latter providing also a German translation (on Sinai, 472:88–90).

64 Evidence revealed after the fire of 1971, combined with earlier observations regarding the substructures in the area of the north corner of the fortress, enabled Forsyth to reconstruct the drainage system at this lowermost point in the monastery. He noted that a sixth-century rainwater channel drains the complex and collects runoff at the northern end of the northwest wall, diverting it to the monastery garden (drawings 602, 619; *Monastery* [1973], pl. XX, B). He concluded that two arched openings north of this drain, along with four similar openings in the northeast wall (drawings 602, 620; notes on drawings 604, 605, 619, 623a) served as "emergency floodgates" (figs. 4 and 5). That this part of the perimeter wall experienced great pressure at times may be indicated by the large relieving arch with fill visible on the exterior (*Monastery*, pls. IV, B; V, A). In Tsafrir's view, as expressed to Forsyth, this arch was the vestige of a former entrance, "the blocked door of the Abbot." Forsyth debated this idea in his field notes (p. 459), writing: "Such an interpretation seems impossible for the following reasons:—the 'door' clearly did not exist in the mid-eighteenth century, nor did the present top story of the corner. Probably they both belong to the same later campaign of construction, the 'door' really being a reinforcement of the lower, older wall before superposing on it the great burden of the top story which at this point might have crushed the three drains immediately below;—'door' is very improbable at such excessive width (5.65 m!) and height: arch is much too thin and flat (and pinches out at south side) to carry the massive load above a void, sans rubble; arch has no real supporting jambs (on north side it rests on sharp vertical line of former buttress; but on south side there is a jagged line of courses;—inner face of rubble fill under arch is visible down to the course above drains. For above reasons the 'door' surely is not a door." See Y. Tsafrir, "St. Catherine's Monastery in Sinai: Drawings by I. Dunayevsky," *IEJ* 28 (1978): 224–27, fig. 4:12, pls. 49A–B; for water runoff in the area, see I. Finkelstein and A. Ovadiah, "Byzantine Monastic Remains in the Southern Sinai," *DOP* 39 (1985): 39–79.

minimize the damage of torrential runoff while collecting precious water for the monastery's use.

Forsyth long tussled with the vexing question of the monastery's defensive capacities and the related question of the military versus monastic function of elements of the complex. Procopius's discussion of Sinai, while preoccupied with questions of security and defense, incorporates a rare account of the monks' religious life. Drawing on topoi, Procopius describes it as "a kind of careful rehearsal of death" and speaks of the monks being "superior to all human desires"; their solitude is precious to them, he says, and they "enjoy it without fear."[65] Forsyth repeatedly pondered the statement that Justinian "built a very strong fortress and established there a considerable garrison of troops," the enemy being "barbarian Saracens" who might travel secretly by this route into Palestine proper.[66] He wondered how considerable the troop presence might actually have been and how reliable the monastery's defenses were. Many of his notes deal with the weakness of the siting from a defensive point of view. He heavily annotated his personal copy of a mid-sixth-century guide to military strategy written by an anonymous army engineer at the height of the Justinianic era, noting the point where the strategist offered guidance for the siting and protection of forts and cities ("suitable sites . . . are those on high ground with steep slopes all about to make approach difficult").[67] Still, as Eutychius would say, at Sinai one could climb the northern slope and toss a stone at the monks inside the monastery.[68] It troubled Forsyth that the steep slopes would have readily allowed invading archers to dominate the fortress. He considered the evidence for military preparedness—several *meutrières* and loopholes, as well as indications, especially on the southeast wall, that there was a *chemin de ronde* abutting the crenellated walls, allowing circulation and potentially useful in defense.[69] Although early in his thinking he entertained the idea that the monastic fortress might have been an outpost in an elaborate defense system, or part of a *limes*, he became increasingly aware that, contrary to Procopius's description of it as "very strong," the structure's defensive character was not very formidable. The efficacy of the loopholes was questionable—they were "too cramped for shooting," "too casual" in arrangement, and too "sparse" in number—and he concluded that their primary function was to afford light and ventilation.[70] Moreover the complex lacked effective flanking towers to provide enfilading fire. This led to the conclusion that the towers made a show of invulnerability, that Sinai was a "token fortress," no more than sufficiently intimidating to "overawe" tribesmen; he quoted in support Procopius's scornful reference to the weakest kind of mud barricade at Rusafa being sufficient to check Saracen raids.[71]

65 Procopius, *Buildings* 5.8; Dewing–Downey, 355–57.

66 Procopius, *Buildings* 5.8; Dewing–Downey, 357. As Cameron observed, for Procopius, Sinai "Saracens" was probably a general term for tribal barbarians, raiding parties, or even "bedraggled beggars." Cameron, *Procopius*, 96–97. In *The Mirage of the Saracen* (n. 47 above), Ward's overarching argument is that Christian monks justified their occupation of Sinai by making the indigenous nomadic peoples into a barbaric "Saracen" other.

67 "Anonymous Byzantine Treatise on Strategy," in *Three Byzantine Military Treatises*, ed. and trans. G. T. Dennis, Dumbarton Oaks Texts 9 (Washington, DC, 1985), 28–43, esp. 33.

68 Mayerson, "Procopius or Eutychius," 37.

69 See *The Monastery*, pl. VII, C–D. For Grossmann's suggestion that rooms were constructed in two stories as casements along the inner face of the walls, see "Neue baugeschichtliche Untersuchungen," 544–51 (n. 44 above); the idea is supported by U. Dahari, *Monastic Settlements in South Sinai in the Byzantine Period: The Archaeological Remains* (Jerusalem, 2000), 54–64, at 57–59. Forsyth concerned himself with reconstructing monastic living quarters. In analyzing the substructures in the east corner of the monastery, for example, he concluded that the original sixth-century refectory (a lofty longitudinal hall measuring about 13 × 5 m) was located above the three smaller rooms along the southeast wall and was warmed by the remarkable beehive oven below. Assuming two long tables, he estimated that the refectory's seating capacity would have been approximately ninety-six. Forsyth, Sinai Field Notes, 1965.85, 109, 146. See also *Monastery* (1973) (n. 2 above), pl. VII, E (put-log holes for ceiling beams of refectory).

70 Forsyth, Sinai Field Notes, 1956.104 and 1965.140.

71 Procopius, *Buildings* 2.9; Dewing–Downey, 157 (n. 19 above). On the basis of a remark in "The Monastery" (1968) (n. 2 above), 18, Dahari, following Grossmann, imputes to Forsyth a conviction that the monastery was a military citadel sustaining a garrison (*Monastic Settlements*, 63), not taking into account the more qualified statement in *Monastery* (1973), 5–6. Dahari, 57, suggested that "the wall was meant to serve as a passive defense measure at best." Most recently, in *Mirage of the Saracen*, 121–26, Ward defends Procopius's appraisal of the strategic importance and efficacy of the fortifications at Sinai, arguing that soldiers may indeed have been garrisoned there early on.

Implications

Critical questions, difficult to answer, will doubtless long continue to bedevil our thinking about Sinai. A number of them have to do with the fortress's remote location, particularly how and why such an extensive and expensive venture should have been undertaken. Forsyth spoke of "the sheer physical achievement of implanting in a howling wilderness this sophisticated structure, partly built of recalcitrant local granite and partly of materials imported with infinite toil."[72] Clearly the motivations driving the commission were extraordinary, as recent discoveries have confirmed.

Excavations at the summit of Jebel Musa have now made it possible to reconstruct the appearance of the small basilica constructed at the awesome site of the delivery of the Tablets of the Law. At some point much of this structure, once squeezed into a declivity atop the rocky ledge, dramatically collapsed, possibly the victim of an earthquake.[73] Since the current structure was largely of twentieth-century date (1933–34), Forsyth devoted little attention to it, even if he, like others, was aware that Justinianic elements had been incorporated into its fabric.[74] The Hellenic Archaeological Mission to South Sinai has now assembled evidence to suggest that it incorporates the apse of a sixth-century church (which had itself incorporated the fourth-century oratory mentioned by Egeria). Three-aisled and timber-roofed, the church on the summit bore striking similarities in plan, building material, and interior ornamentation to the Justinianic basilica in the complex below; the discovery of pieces of marble and mosaic tesserae indicates that the chapel was decorated in the same opulent manner. Petros Koufopoulos and Marina Myriantheos-Koufopoulou have called attention to the extraordinary challenge of transporting finished blocks of red granite (weighing ca. 100–300 kg) from the quarrying site near the fortress to the summit of the mountain on steep, rock-cut steps.[75] The materials for making mortar had to be hauled up as well, and water too, should the three newly built vaulted cisterns run dry. This church, a "humbler imitation" of the lower church, may even have been built by Stephanos of Aila.[76]

That the architect of the lower church enjoyed local renown is indicated by the length and placement of the inscription that recalls his endeavor, especially when compared to those honoring Justinian and Theodora—all three originally visible above eye level in the lateral beams of the nave ceiling. Forsyth studied with particular fascination the carved wood beams and trusses of the roof, which have, miraculously, remained relatively undisturbed since Justinian's time (fig. 13).

Thirteen great beams span the nave of the church—all of them "monoliths" cut from a timber more than twenty feet in length and so broad in diameter that they could be quartered to create these supports. Each beam forms the lower base of a five-part triangular truss composed of diagonal rafters fitted with bearing blocks, a vertical tension member, and two small diagonal compression members, the whole resting in a state of static equilibrium (figs. 9, 13).[77] The three visible faces of the beams were sheathed by carved wood planks.[78] All the wood had to be imported. Just how building

72 Forsyth, "Monastery" (1968), 19.

73 See S. Kalopissi-Verti and M. Panayotidi, "Excavations on the Holy Summit (Jebel Mūsā) at Mount Sinai: Preliminary Remarks on the Justinianic Basilica" and P. Koufopoulos and M. Myriantheos-Koufopoulou, "The Architecture of the Justinianic Basilica on the Holy Summit," in *Approaching the Holy Mountain* (n. 13 above), 73–105, 107–17.

74 Forsyth, "Monastery" (1968), 14 n. 17.

75 Koufopoulos–Koufopoulou, "Architecture," 110.

76 Owing to differences between the structures, Kalopissi-Verti and Panayotidi, "Excavations," 90–91, are not prepared to concede that Stephanos built both, as assumed by Peter Grossmann in "Wadi Fayran/Sinai: Report on the Seasons in March and April 1985 and 1986 with an Appendix on the Church at Mount Moses," *ASAE* 75 (1999–2000): 153–71, at 162–65.

77 In 1961, before the two last expeditions to Sinai, Louis F. Michel, a student of George Forsyth at Michigan, wrote a seminar paper, "Carpentry at the Monastery of St. Catherine, Mount Sinai, Egypt," offering a superb statical analysis of the truss system on which Forsyth would rely. Michel argues that the trusses are "overdimensioned," capable of bearing at least fifteen times more than the weight of the extant roof.

78 Having received results of carbon-14 testing from Richard Burleigh at the British Museum (supplementing earlier tests), Forsyth responded in a letter of 19 October 1976 by saying the test confirmed that "the roof frame of the church is an original and unreconstructed product of the 6th century and is therefore earlier by some five centuries than similar structures which are in a comparable state of preservation elsewhere." On the matter of wood type, Harold L. Mitchell, Chief of the Division of Timber Growth and Utilization Relations, U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin, reported in March 1961: "The wood specimen from the temple [monastery] in the Mt. Sinai area is identified as belonging to the Laricones section of *Pinus*. The most likely prospect in this section is *Pinus nigra* var. *caramanica*, which is native to Asia Minor. Some authors consider

FIG. 21. Camel bearing timber, floor mosaic in sixth-century basilica, Petra, Jordan (after *Petra Rediscovered*, fig. 267)

elements of such size were carried across the desert and up to the monastery remains uncertain. Draft animals would not have fared well in the mountains, and though camels often balk at such labor, in a sixth-century mosaic pavement that turned up in recent excavations at Petra, a site presenting analogous challenges to builders, a camel is portrayed with a very long beam strapped to its back (fig. 21).[79] The Sinai timbers would have been worked on-site by the finishers who assembled the trusses as well as the carvers who fashioned the extensive friezes on the sheaths decorating the undersides of the beams: these friezes are carved with animated birds and quadrupeds, sea creatures and Nilotic animals, and vegetal rinceaux. They were painted red and gold in the eighteenth century when ceiling panels were dropped between the beams, hiding (but not damaging) the three significant inscriptions on the vertical faces of the sheathing, transcribed by Ševčenko as part of his survey of extant inscriptions (fig. 22).[80]

The inscriptions naming Theodora and Justinian appear on the west face of the seventh and eighth beams, positioned to be visible to anyone entering the church and approaching the apse. They are relatively short: † Ὑπὲρ μνήμης καὶ ἀναπαύσεως τῆς γεναμένης ἡμῶν Βασιλίδος θεοδώρας ("In memory and for the repose of our deceased Empress Theodora") and † Ὑπὲρ σωτηρίας τοῦ εὐσεβεστάτου ἡμῶν Βασιλέως Ἰουστινιανοῦ ("For the salvation of our most pious Emperor Justinian").

this variety to be a distinct species and refer to it as *Pinus pallasiana*" (Forsyth papers).

79 See Z. T. Fiema, "The Byzantine Church at Petra," in *Petra Rediscovered: Lost City of the Nabataeans*, ed. G. Markoe (New York, 2003), 329–49, at 243–46, fig. 267. Forsyth and Anderegg corresponded about the problem of how the beams were transportated: paired camels was their best guess. 13 July–3 August 1975 (Forsyth papers).

80 On the carved sheaths, see L. J. Drewer, "The Carved Wood Beams of the Church of Justinian, Monastery of St. Catherine, Mount Sinai" (PhD diss., University of Michigan, 1971). Comparing the carving to that at the contemporary church of St. Polyeuktos in Constantinople, Drewer, 11–29, argues that the carvers were not Constantinopolitan but influenced by work from the capital. Here and in later articles she interprets the program as rich in references to paradise and messianic peace. See also H. Maguire, *Earth and Ocean: The Terrestrial World in Early Byzantine Art* (University Park, PA, 1987), 28–30. Related iconography is found on the contemporary wood door leading from the narthex to the nave. Forsyth and Weitzmann, *Monastery* (1973), pls. XLVI–LVII (door), LXVI–LXXXIII (beams and trusses).

FIG. 22. Ihor Ševčenko examining latex molds of the inscriptions on the church beams and lintel at the Monastery of St. Catherine, Mount Sinai (after *National Geographic* 125 [Jan. 1964]: 94)

These imperial memorials are separated from the far longer inscription honoring the builder, and they are differently oriented: his appears on the first beam of the nave, on the eastern face, visible upon departing the church. As transcribed and emended by Ševčenko, it reads: † Κ(ύρι)ε ὁ θ(εὸ)ς ὁ ὀφθεὶς ἐν τῷ τόπῳ {του} τούτῳ, σῶσον καὶ ἐλέησον τὸν δοῦ[λον] σου Στέφανον Μαρτυρίου, δι(ά)κο(νον) καὶ τέκτονα Ἀϊλήσιον, κ(αὶ) ἀνάπαυσον τὰς ψυχὰς τῶν τέκνων αὐτοῦ Γεοργ(ίου) [καὶ Νόννας][81] ("O Lord God who was seen in this place, save and have mercy on your servant Stephanos, son of Martyrios, the deacon and builder from Aila, and give rest to the souls of his children Georgios and Nonna").[82] Stephanos's epithet is significant: he is called τέκτων, possibly to be translated as "architect" but more likely as "builder"; the term properly refers to an artisan working in wood.[83] He is also called "deacon" (διάκονος), a coupling that may suggest an unusual status. It is striking that the local architect was granted so prominent a memorial, and others involved in the sixth-century enterprise were commemorated as well. The dedicatory inscription along the base of the mosaic in the apse documents that the work, owed to the gifts of many, was accomplished under "Longinus, priest and abbot" and by the effort of "Theodore the priest."[84] In the corner roundels Longinus and "John the Deacon" are represented. All were local churchmen, as was the patron whose name was discovered on the second triumphal arch of the stone stairway, as noted above: "For the salvation of Abba Iohannes, the abbot and . . . ." In *Buildings* Procopius created a memorial to Justinian as instigator of building projects, trumpeting the ruler's participation in the redesign and refurbishment of settlements in his empire, presenting him as deeply involved in finding solutions to thorny engineering problems. Yet neither Justinian nor Procopius ever visited the monastery. The on-site inscriptions call attention to the complex array of patronage, distant and local, and competing claims to honor and to the prayers of monks and pilgrims.

It was Forsyth's conviction that, however much the design of the complex at Sinai belongs to larger currents in early Byzantine architecture, the spatial intelligence of the designer and his creativity as an engineer can be understood only in relation to local exigencies. Materials and artisans might have come from afar, and little could be accomplished without imperial donation, but on-site conditions demanded adaptive strategies. As Forsyth sought to show, the monastery of St. Catherine exists semi-intact to our day, in its bold fastness, owing to the brilliance of its architect. This figure studied the site and pinned the monastery and its church, irrevocably, to the rocks of the sacred mountain, even as he helped to orchestrate a pilgrim's progress to the summit—where a second, complementary basilica was constructed.

The practical, aesthetic, and spiritual dimensions were deeply interwoven, Forsyth believed, down to the smallest detail. If the experience of seeing the apsidal mosaics is memorable, particularly at sunrise as an eastern light illumines them, or at sunset, when they dazzle with another sort of glow, it is because of the builder's careful placement of the eastern and western windows of the gables. The surprising heights of the eastern and western gable façades, so apparently disjunct with regard

81 Ševčenko, "Early Period of the Sinai Monastery" (n. 50 above), 262. Rabino's earlier transcription and translation, *Le Monastère* (n. 40 above), 18, 101, offers an alternative. † Κύριε ὁ θεὸς ὁ ὀφθεὶς ἐν τῷ τόπῳ τούτῳ σῶσον καὶ ἐλέησον τὸν δοῦλον σου Στέφανον Μαρτυρίου, Δίκ. καὶ τέκτονα Ἀϊλήσιον καὶ Νόνναν καὶ ἀνάπαυσον τὰς ψυχὰς τῶν τέκνων αὐτῶν Γεωργίου Σεργίου καὶ Θεοδώρας ("Seigneur qui te montras en ce lieu, sauve et prends en pitié ton serviteur Stéphanos, d'Aïla, fils de Martyrios, constructeur et architecte, et Nonna, et donne le repos aux âmes de ses enfants Géorgios, Sergios et Théodora"). The odd spacing of the inscriptions, with breaks, is owed to the application of decorative roundels at intervals.

82 Adapted from the recent translation by Dahari, *Monastic Settlements*, 60, based on a Hebrew translation published by Yoram Tsafrir in 1990. Tsafrir and Forsyth were in contact; the Israeli scholar visited Ann Arbor to look at Forsyth's drawings. For Tsafrir's perspective, see "Monks and Monasteries in Southern Sinai," in *Ancient Churches Revealed*, ed. Y. Tsafrir (Jerusalem, 1993), 315–33.

83 On terminology and the changing implications of *mechanikos*, *mechanopoios*, and *architekton* among other professional designations, including vocabulary related to the carpenter's trade, see G. Downey, "Byzantine Architects, Their Training and Methods," *Byzantion* 18 (1946–48): 99–118; *ODB* 1:382–83; R. Ousterhout, *Master Builders of Byzantium* (Princeton, 1999), esp. 43–45.

84 In Forsyth and Weitzmann, *Monastery* (1973), Ševčenko, "Inscriptions," 20, noted that this was one of only two inscriptions at Sinai without spelling errors, which indirectly supported Weitzmann's claim, "Introduction," 16, that the mosaicists came from Constantinople (both n. 12 above).

to the much lower height of the roof over the nave of the church, may too have played a calculated role in the design. As Forsyth tried to account for the peculiar effect of different pitches for the roof and the gables, he saw that, aesthetically, these tall gables seem to "lift" the church from its "sunken" position in the overall plan.[85] As his studies progressed, he became increasingly disinclined to explain unexpected features as the product of "provincial" awkwardness, seeking their rationale in imperatives presented by local conditions. Through his patient gathering of data, much of it underground in the *souterrains*, he was able to find merit especially in those aspects of the structures that capitalized on peculiarities of the site. For him, the organization of component parts in an irregular manner constituted a brilliant response to the governing necessity of designing a terraced plan, one that offered ample facilities for the control, collection, and use of water.

Forsyth's suite of finished drawings offers a lucid record of his decades-long pursuit of the logic of the architect's decisions. As the outward sign of his internalized search for the motivations that drove the creative process, they concretize revelations that came to him in incremental fashion. The many dated entries on his Sinai field notes provide evidence of the layered and accretive nature of his reasoning. Gradually, over time, Forsyth came to understand the monastic complex as a masterpiece of strategic siting and hydraulic engineering, a successful subjection of a recalcitrant rocky and mountainous site to architectural ingenuity.[86]

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85 The availability of wood of particular measure might have been a factor as well, a lower-pitched truss requiring shorter lengths of the precious commodity.

86 In the fall of 1953, Erwin Panofsky read through Forsyth's newly published monograph, *The Church of St. Martin at Angers*, and examined its large-scale measured drawings. What he intuited about Forsyth's purposes and articulated in a letter might well be said of the work that Forsyth undertook at the Monastery of St. Catherine a few years later: "Quite apart from the unparalleled attention to every detail and the magnificent plates (which will enable future generations to rebuild the whole thing, stone by stone, should it be destroyed by an earthquake or an atomic bomb), you've managed to keep the whole thing alive, to convey the impression of an organism growing and decaying in and with its environment, and to coordinate the individual object with a truly impressive image of general developments." Panofsky to Forsyth, 14 September 1953; in E. Panofsky, *Korrespondenz*, ed. D. Wuttke (Wiesbaden, 2006), 3:484–85.

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